NEWS IN PERSPECTIVE

MAY 15, 1961

ECONOMIC CLIMATE

ECONOMIC UPBEAT can easily be seen in the figures and reports compiled by business and the government. Personal income has recently scored a significant rise to an annual rate of almost $408-billion, even after washing out a misleading $1.8-billion attributable to a speed-up in payments of dividends on GI insurance. Business demand for money is growing, too—a good indication that further improvement in economic conditions is expected. Liquidation of business inventories is continuing, paving the way for re-ordering as retail trade continues high. Recently, consumers have stepped up their purchases of hard goods and have continued to spend generously for non-durables. Instalment debt, too, is being paid down—freeing money for current spending and making more credit available for major purchases. Factory workweeks are lengthening, and the seasonal upsurge in construction is well under way.

NO NEW INFLATION is implicit in the business upturn, despite the fact that it clearly is based in part on anticipated increases in government spending. This is not to say that prices will abruptly stop rising. But the inflationary zoom that has marked recovery from three earlier postwar recessions is not likely to recur. There are no shortages of consumer goods; in fact, competition is fierce and price boosts are imposed reluctantly. Availability of competitive foreign goods also militates against price hikes. Likelihood of a persistently high rate of unemployment will also tend to curb inflation. Even impending federal budget deficits are not so large that brisk business cannot overcome their inflationary impact.

IMPROVEMENT, DAY TO DAY, is noted by the National Association of Purchasing Agents. This group reports new orders rising and output expanding. Inventory policy remains cautious, with few signs of forward buying. Stocks on hand have been cut back to a balance, in many cases.

MANAGEMENT VIEW

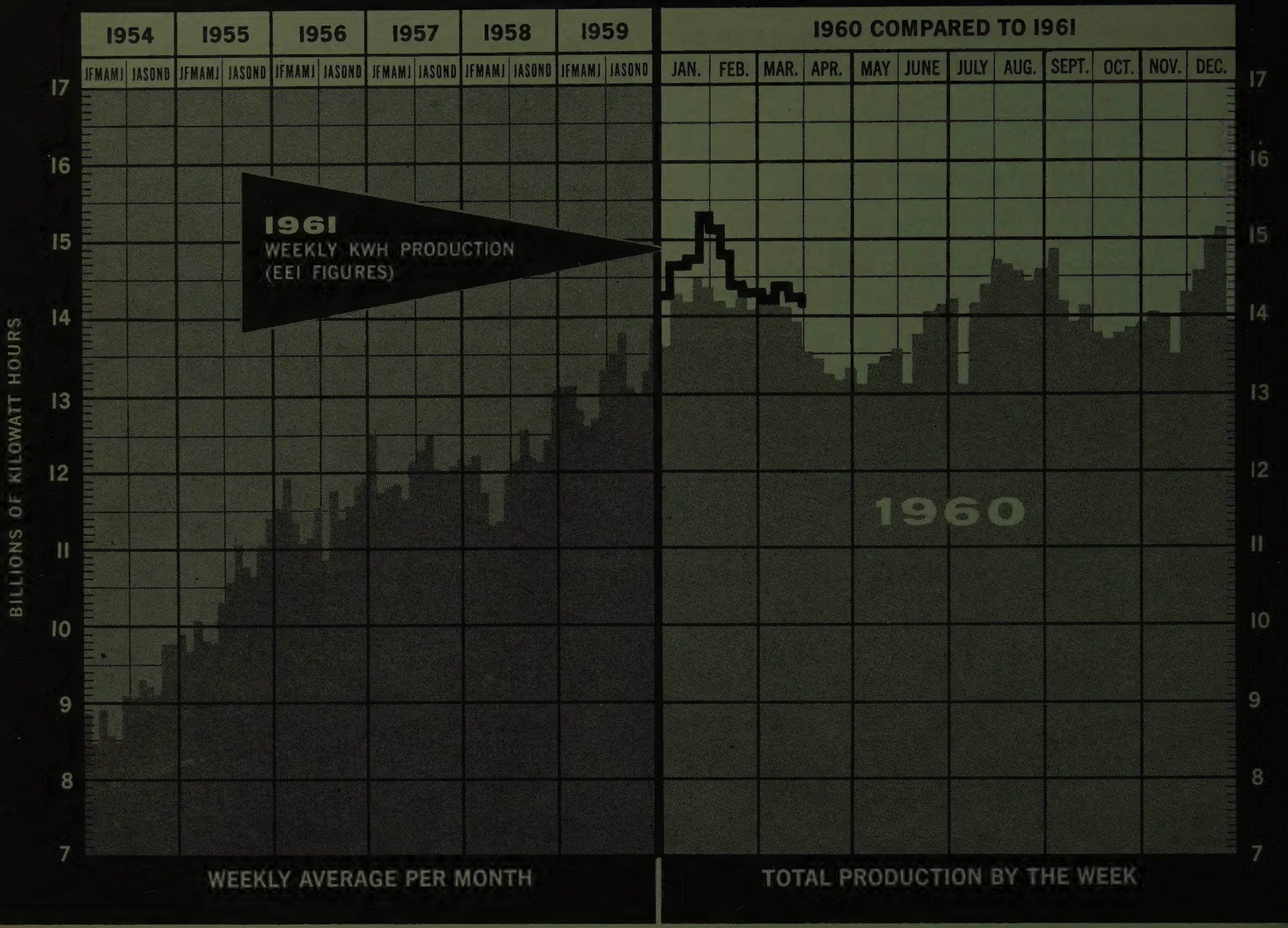
A COMBINATION SYSTEM OF TRANSMISSION sought by investor-owned utilities in the Colorado power project grid, "would provide by a large margin the greatest benefits to the area, the federal government and the nation as a whole," compared with an all-federal system . . . and this could be shown if the same set of criteria were applied to both by the Reclamation Bureau, according to Robert T. Person, president of P. S. Co. of Colorado. Recently, he charged that different yardsticks were used to compare the systems. (But, former Interior Secretary Seaton, who announced the decision on the all-federal system just before leaving office last January, has denied there was unfair treatment of the investor-owned utilities.)

THE SOUTHWEST'S EHV GRID, a $300-million, 345-kv, 4000-mile line to serve an eight state area, is being hailed by executives of participating investor-owned utility companies for the ways resulting economies and efficiencies will benefit customers over the entire interconnected system. Comments EEI Pres. Sherman R. Knapp: It's the latest step in a nationwide effort (which) now has interconnected almost all of the electric power producing capability in this country . . . with more than 20,000-miles of the EHV lines.

COMMON OWNERSHIP PRINCIPLE now applies to all participants in the Iowa Power Pool in the group's planning of system generation and transmission. "A whole new chapter in electric power planning in Iowa" was opened by this understanding, arrived at recently by officials of the four investor-owned member companies of the Pool, whose administrative committee is now charged with developing all principal planning steps, then submitting them to member company chief executives for approval. Along with the plans will go "recommendations for adjustments required in the Power Pool Agreement needed to mitigate any major inequities affecting individual member companies."

Electric Utility Barometer

(Source: Edison Electric Institute)



NEWS IN PERSPECTIVE

COMMON STOCK SALES will not be needed in the next five years at Pennsylvania P. & L. Co., Chairman Chas. E. Oakes assured shareowners in P. P. & L.'s annual meeting. "To the common stockholders, this is important because there will be a build-up in the book value of the common stock by earnings retained in the business with no dilution from the sale of additional shares. Maximum growth in earnings occurs when all the common equity needed to maintain the common equity ratio comes from earnings retained in the business." (See p. 49).

ANNUAL MEETING DISCLOSURES: At Philadelphia Electric Co.'s it was reported that independent CPA study of the utility's procurement activities indicated no evidence of conflict of interest on the part of directors, officers or employees . . . and policies and practices related to the purchase of goods and services from outside suppliers were found to be well designed and administered; at Con Edison's (N. Y.), management revealed that fuel savings of 30-percent (over $2-million a year) have been affected in operating power facilities purchased from N. Y. City, while the number of employes needed to operate these plants has been cut from 1200 to less than 700; and at Duquesne Light Co.'s management noted a decision to make a complete study of the utility's sales activities . . . "exploring a re-orientation of organization and techniques . . . in effort to accelerate sales growth while reducing promotion expenditures as a percentage of dollar sales."

ANTI-TRUST SUIT PROCEEDS will have little or no effect on rates or dividends, customers and shareholders should realize, D. K. Kadane, Long Island Lighting Co.'s general counsel advised shareowners at LILCO's annual meeting. He said: "We have purchased a total of about $30-million of equipment involved in these cases. If we received back the entire purchase amount and if all the proceeds were used to reduce the rate base, the effect on the rates would be less than 1.5%."

STORM ABOUT FISH IN THE SNAKE RIVER —The fish problem "has clouded the basic issue of development of the Snake River," says Managing Director Owen D. Hurd of the Washington Public Power Supply System which decided last month to include the High Mountain Sheep plan in its Nez Perce FPC license application. Earlier, Kinsey M. Robinson, board chairman of Pacific Northwest Power Co., criticized the Interior Dept.'s proposal for deferment of new power construction until after completion of a four-year fish research program, noted it would take 15-20 years for an adequate study, emphasized that High Mountain Sheep can be built now . . . while any delay in building the one-million-kw project "risks serious regional power shortages later in the 1960's."

"WHITE COLLAR" CONTRIBUTIONS are apparently overlooked by many businessmen, states Ebasco's A. F. Everman. The senior management consultant says that such views (that office efficiency has failed to keep pace with production gains) are often based on superficial analysis. Instead, he avers, the office in recent years has changed from a mere recording operation to the "intelligence center" in many organizations. Still room for improvement?—Yes, says Mr. Everman, "by slowing the rate of office costs increase."

WASHINGTON INFLUENCE

DRASTIC REVISION OF FPC is urged by President Kennedy in his message on regulatory agencies. Besides making specific recommendations for the backlog of natural gas cases, Kennedy suggested that the five-man commission be enlarged to seven members who would divide up the work and assign gas and electric cases to various panels. The President also said that a chairman "should be responsible to the President and serve as chairman at his pleasure." Kennedy's power to choose the head of FPC is in doubt because of particular legislation and Chairman Kuykendall shows no sign of stepping down. In his message, Kennedy also suggested raising the pay and prestige of hearing examiners and creating an Administrative Conference of the U. S. to discuss regulatory problems. No mention was made of the controversial "White House Czar" and many of the ideas suggested by the task force specialist, James Landis, were not even mentioned.

SIX MORE CIVIL SUITS against equipment makers have been filed by the Justice Department. Attorney General Kennedy said the damages sought would run into millions of dollars, but no specific claims are made because the job of analyzing data on government purchases has not been completed. The suits involve power switchgear assemblies, transformers, turbine-generators, distribution transformers, low voltage distribution equipment, and low voltage circuit breakers. Eleven corporations are named as defendants in one or more suits and seven corporations are named as co-conspirators but not defendants. Kennedy warned that still more damage suits may be filed by the government. (Meanwhile, U. S. Dist. Judge Ganey extended to June 15 the deadline for an answer from five manufacturers to the government's first suit, alleging $12-million damages.)

PROPOSED FPC LEGISLATION, sponsored by Sen. Magnuson (D., Wash.), chairman of the Senate Interstate Commerce Committee, would (1) authorize FPC to refuse to a party the right to intervene if its interests are already adequately represented; (2) permit FPC to delegate some of its work to Commissioners or subordinates; (3) let FPC exempt small hydro projects from certain of its licensing provisions; and (4) require FPC approval of abandonment or curtailment of interstate electric facilities or service after opportunity for hearing. The bill also provides for changes in natural gas regulation.

"TERRITORY INTEGRITY" for REA co-ops has been endorsed by REA Administrator Clapp. He noted that in many states the rights of co-ops' to serve areas have been questioned by private power. Clapp called it a "matter both of equity and protection of REA's investment" that the co-ops stay to serve what they "developed in good faith." Interregional transmission ties also received Clapp's blessing.

INDUSTRY SIFTINGS

INDUSTRY ANTI-TRUST DEFENSES fought back in numerous actions in recent weeks: (1) The Senate investigation by Sen. Kefauver's subcommittee proceeded after some opposition (notably by Wisconsin's Sen. Wiley), with early witnesses (employes of electrical firms) testifying about bid-rigging and price-fixing activities practiced prior to 1959; (2) NEMA's board of governors decided to have the Association "explore the possibilities open to it to give guidance to its members" through development of a code of ethics for the electrical manufacturing industry (a step which Pres. Cresap of Westinghouse had endorsed a week earlier); (3) to steer anti-trust compliance efforts, certain manufacturers continued moves to hire counsel with special background (General Electric retaining Clark Clifford, ex-White House aide, Joslyn hiring W. L. Maher, who headed the Justice Dept. anti-trust division in Philadelphia, for example); and (4) new denials of anti-trust acts came from General Motors ("GM is not guilty of the monopolistic practices charged in the Justice Dept....indictment," in connection with its production and sale of diesel electric locomotives) and from GE ("Anyone who thinks the meter prices we quoted the City of Cleveland were established by collusion with competitors must think we have 'rocks in our head.'")

NATIONAL ELECTRICAL WEEK WRAPUP: N.E.W. activities were carried on last February in more than 300 communities in the U.S. and Canada, and the extensive reports from these activities are to be published as guides for planning the next observance, scheduled for Feb. 11-17, 1962. For the 1961 observance, 6,500 planning guides were distributed, more than 700,000 pamphlets of various kinds were sent out.

SEA WATER CONVERSION remains uneconomical, R. W. Spencer of So. Cal. Edison reported to a recent ASCE meeting, because a successful conversion method has not yet been found. He added: "Fresh water from the sea by any presently developed distillation method will never be economical compared to the long-distance importation of natural fresh water supplies, because of inherently high sea water conversion costs and still higher transportation, pumping and distribution costs."

AREA DEVELOPMENT ACTION is impressive in a wide range of effort, from the appealing literature of utilities like Northern States Power Co. (which distributes an effective assembly of excerpts from its 1960 "Wall Street Journal" ad campaign)--to the Los Angeles Dept. of Water & Power (which produced a convincing new booklet about "Los Angeles: Headquarters City"); from the recently published tribute of N. Y. State Commerce Commissioner McHugh's to the vital role of utility industries in generating expenditures of more than $4-billion for new industrial facilities in the Empire State--to the special role of Pacific Gas & Electric's V-P O. R. Doerr, as president of the San Francisco Chamber of Commerce in coordinating the efforts of 13 Western states and numerous federal government agencies in staging a new Western Space Age Industries and Engineering Exposition (scheduled for the Cow Palace in April, 1962).

GENERATORS IN THE NEWS—For Commonwealth Edison, Westinghouse will build two 560,000-kw units, the first to be installed in '65; General Electric is the apparent low bidder on eight units for the Glen Canyon project on the Colorado River (due to produce first power in June, 1964), after 12% was added to a Fairbanks-Morse bid proposing manufacture by an allied firm in Genoa, Italy; Allis-Chalmers has an order to ship two 83,333-kva generators for the Bureau of Reclamation's Central Valley Project in Shasta County, Cal., by the end of 1961; and orders from Japan for steam-electric units include: from General Electric, two 375,000- and two 350,000-kw units... and from Westinghouse, a 325,000-kw unit (which is "larger than any yet made in the U. S. for export", but not "to be the largest", as noted in EL&P, Apr. 15).

"Little Black Box"—End Of Utility Business?

Is the "little black box" concept of the gadget in some hidden closet of every home silently ticking off electric power likely to mean the end of the utility business as we know it?

EEI's President Sherman Knapp doesn't think so. The president of Connecticut Light and Power Co. offered his reasons to the Annual EEI Sales Conference. He observed:

"The present system of electricity supply is based on central generating stations using larger and more efficient generators.

"The greatest hurdle that the little black box has to contend with in upsetting this system is what all utility people are well aware of, namely, the diversity factor. While it takes a little black box with a capacity of 10 kilowatts to supply the electric range of an individual home, it takes only 60 kilowatts of central station capacity to supply 100 electric ranges on our distribution lines. This is only six-tenths of one kilowatt per range, or one-sixteenth as much as the 10-kilowatt productive capacity of the little black box which would be required to serve the individual range.

"This factor of diversity exists with practically every application of electricity in the home. The overall effect of the diversity factor is that the total generating capacity provided at the central station is only a fraction of the total capacity which would have to be provided by all the little black boxes."

Another important hurdle for the little black box is the relation between cost per kilowatt of capacity, and size of generator. "In practically all devices," Mr. Knapp said.

"The combination of diversity and cost-size relationship constitutes the primary reason why we need not be concerned in the near future," concluded Mr. Knapp.

Can Shareowners Help Sell KWH? – P. P. & L. Co. Thinks So

Shareowners may or may not be a company's best customers . . . but it doesn't hurt to treat them with customer-care. Pennsylvania Power & Light Company feels that way about it, and in fact, recently made a direct bid to its 90,000 shareowners to become "sales allies" in promoting and exemplifying electrical living.

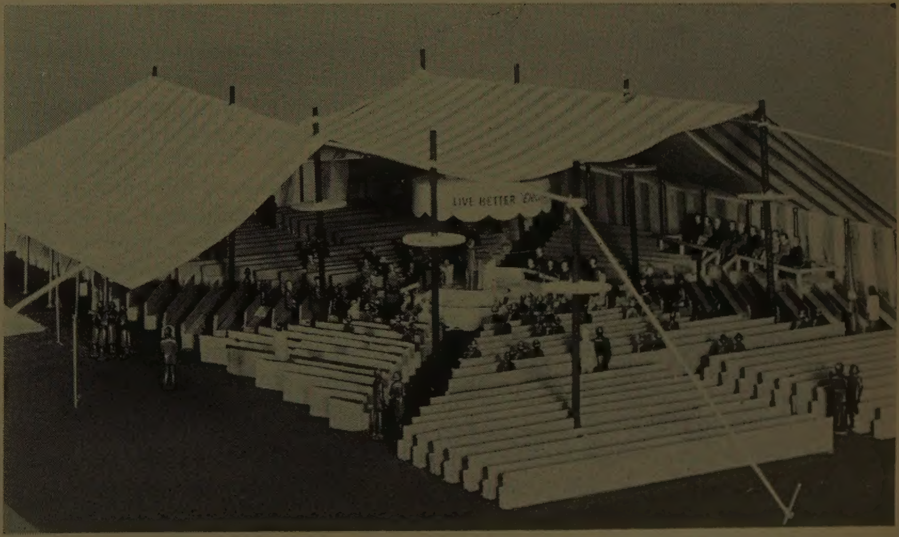
At the utility company's annual shareholder's meeting last month, Pres. Jack K. Busby told the 2,500 stockholders in attendance: "We solicit your active aid . . . as pacesetters and exemplars of electric living." He described two areas in which shareowners can make important and valuable contributions—

"One way is in the field of industrial development . . . the attraction of new industry and the support of existing industry. Our Business Development Department will welcome your suggestions as to concerns we should get in touch with. Through your friends and neighbors and associates, there will be contacts that you can make that can give your Company important help in identifying industrial prospects and persuading these prospects to locate in Central Eastern Pennsylvania.

Related to industrial development is community development in all its aspects, and, in this work, too, Company shareowners can make an important contribution. Tied together with the efforts of others, the vigorous support and leadership of the Company's shareowners in their home communities can be a significant force in enhancing the quality of living in these communities. Since so many of our shareowners reside in Central Eastern Pennsylvania, many communities of our service area will benefit from such action—and in the long run the growth prospects of the Company will thereby be improved.

Mr. Busby also outlined the user role of shareowners:

"In a very real way, the shareowners of the Company can be the Company's strongest sales allies by being pacesetters in electric living. This we hope you will be. Your leadership in community affairs can be helpful in terms of creating a better climate for all investor-owned electric utility companies."



More than 2,500 shareowners met "in-the-round" under a 15,000-sq ft big top last month at Pennsylvania P. & L. Co.'s annual meeting. Scale model shows revolving speaker's platform.

Economic Depreciation And Fair Value Sustained In Indiana

A decision of the utmost importance to all utilities was the recent finding of the Public Service Commission of Indiana in the rate proceedings of the Indiana Telephone Corporation.

This matter goes back to January 11, 1957, when the Indiana Commission granted the Indiana Telephone Corporation an increase in rates based not only on a fair value rate base but also on economic depreciation. The latter finding was the first of its kind for any private utility in this country.

The Commission subsequently reversed itself after a rehearing of the case, and on January 24, 1958, ordered that the original rates prior to its earlier order be reinstated and that the company refund the increased rates it had collected.

The Company then filed an appeal with the Appellate Court of Indiana. The Court in reversing the Commission noted in part that the Commission's Order ". . . is hereby reversed, vacated and set aside; the enforcement of such order is permanently enjoined; and the Cause is remanded to the Commission with instructions to reopen said rehearing and permit further proceedings in said Cause No. 26794 by hearing evidence supplemental to the evidence already before the Commission in said Cause that may be appropriate."

The Indiana Commission thereupon ruled affirmatively to reinstate its earlier findings and the rates which were predicated on that basis.

Because of the importance of the Commission's decisions, its findings in the earlier order of January 11, 1957, are of prime importance to all regulated industry.

Realistic Accounting

This is what the Commission had to say with respect to Dr. Paton's testimony, the Company's first witness:

"1. A major function of accounting is to measure the actual cost of rendering service chargeable to periodic revenue, and this function is especially important in the public utility field, because the cost of rendering service is one of the two basic factors determining the level of charges to customers to be allowed by the regulatory commission;

"2. Underlying ordinary accounting procedure is the assumption of a stable measuring unit, and when this assumption is invalidated the raw data of accounting require adjustment if actual cost is to be correctly determined. In other words, when the records include cost factors represented by varying measuring units it is not possible to determine cost of operation by adding the dissimilar units as if they were the same;

"3. The general effect on corporate financial statements, prepared without regard to the change in the value of the dollar, has been understatement of the actual cost of operation and overstatement of net earnings. The major points at which the ordinary income computations have been invalid are the cost of materials and supplies consumed and the cost of plant consumed. The error is especially marked in the case of plant cost;

"4. The impact of the change in the value of the dollar is especially important in the utility field. A characteristic of this field is the huge investment required in relatively long-lived assets, which means that the cost of plant capacity consumed, depreciation, is a major factor in this area."

. . . .

"7. The conversion of unlike monetary units with different names has long been commonplace in accounting procedure. Domestic dollars of different periods and values should also be converted to a common denominator before drawing conclusions as to total cost and net income—a type of procedure regularly used in some foreign countries, notably France. The serious change in the value of the dollar justifies giving immediate attention to the proper interpretation and conversion of recorded costs expressed in different dollars in all crucial measurements, such as utility regulation and deductions for tax purposes;

"8. Although cost of plant consumed stated in converted dollars is not now recognized by the Internal Revenue Service for tax purposes, the last-in-first-out inventory procedure, which is approved for tax computations, has the effect of recognizing present day costs of materials, and the recent tax development in connection with the sale of a residence also constitutes recognition of the impact of inflation."

Inflation and Rate of Return

Dr. Langum, another of the Company's witnesses, testified among other things that ". . . a business recession or depression will not cause a major decline in the price level, and that this inflation means that we can no longer think of a dollar as a standard fixed unit of measurement without restating those dollars 'in current dollars or in terms of the present price level' in order that they may 'have full comparability and true meaning.'"

The continued increase in the Consumers Price Index, in spite of the business recession, has amply borne out the contention of this witness.

As to the standards of a fair rate of return, Dr. Langum concluded by saying that ". . . a fair return to the Company involves a return based on adequate consideration of current cost in fair value rate base, and must take account of adjustment to inflation in returns on equity investments and valuation of property at present price levels; and a fair return measured chiefly by the current cost of capital and applied to a fair value rate base would accomplish these considerations."

The Commission's Findings

These are of the utmost importance, since the Commission noted among other things that:

"Depreciation is as much a cost of doing business as wages and salaries and other obvious operating expenses; depreciation is the cost of plant or property consumed from day to day in the production of services sold by a utility. Depreciation, or the cost of plant consumed, measured in current dollars, and related to other factors

(Continued on page 92)

AEC TENTATIVE REORGANIZATION to separate its regulatory functions from its promotional efforts means putting Licensing and Regulation, Compliance, and Health and Safety under the control of one man—Harold L. Price—who reports directly to the Commissioner, not to AEC's general manager. AEC's plan, worked out under the old Administration, means that Price would direct all licensing and regulation except those cases where a final decision rests with a hearing examiner or the full Commission and those cases involving AEC's authority to approve regulations—that is, certain broad health and safety matters and indemnity problems. Price's division would do staff work on safety of reactor sites but final decisions would be higher up. Left unchanged would be AEC's procedure for approving licenses for reactors.

JCAE STAFF STUDY suggests an internal Atomic Safety and Licensing Board composed of three members appointed by the President and subject to Senate confirmation. The Board would provide hearings before a technical group "competent to pass on substantive safety questions." (A study of the University of Michigan Law School recommends a separate agency to exercise AEC's regulatory functions.)

OFFICE OF COMMERCIAL ACTIVITIES planned by the AEC has approval of the U. S. Chamber of Commerce. AEC is considering having field offices report on all work they are thinking of assigning to government-owned facilities and what steps they have taken to determine private industry's interest and ability to do the job.

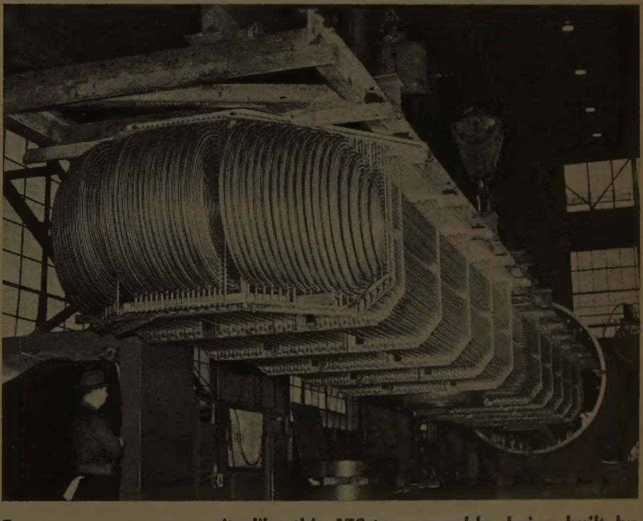
STARTUP TIME AT A-PLANTS—*At Dresden,* the resumption of operation after modification of control system components occurred with a new startup on Apr. 20 (at a power level not to exceed 100-kw); at the *Enrico Fermi* plant, startup could be affected by July 15, PRDC Pres. Walker Cisler noted in recent hearings in Washington, provided that validity of the project's construction permit is supported by a Supreme Court decision that was still forthcoming in mid-April; and at ConEdison's *Indian Point Plant,* full-scale operation is expected to be deferred until after the first of '62 (from a startup initially set for last month), due to labor tieups at the New York facility.

YANKEE'S PLANT COSTS, have been some $7-million less than the $57-million estimated for the project, for which Westinghouse furnished the PWR reactor. This, called the first "underrun" for a U. S. nuclear powerplant, may permit power costs of 12-14 mills, according to Yankee's Pres. Wm. Webster. And, as revealed in the AEC's 1961 publication "Costs of Nuclear Power" (TID-8531), lower cost estimates are indicated for the Indian Point Plant (down from $100 to $89.5, but not including R&D costs in the most recent figure); and for the pressurized water reactor project of the Carolinas-Virginia Nuclear Power Association (down from an earlier $24- to $17-million, though it doesn't include power generating facilities).

AEC LITERATURE REFERENCES: *"Index to the Ten-Year Civilian Power Reactor Program (TID-8518 Series),"* from U. S. Govt. Prtg. Office for $0.15 a copy; *"Nuclear Reactors Built, Building or Planned in the U. S. . . ." (TID 8200, 3rd Rev.),* free from the Office of Tech. Infor. Ext., AEC, P. O. Box 62, Oak Ridge; *"Costs of Nuclear Power" (TID 8531),* from OTS, Dept. of Commerce, Wash. 25, D. C. for 50-cents a copy; *"Eighteen Questions and Answers about Radiation,"* from U. S. Govt. Prtg. Office for 25-cents a copy.

USING FOSSIL FUELS FOR A-POWER, a report made by Ebasco Services for AEC, evaluates using coal, oil, and gas superheaters in combination with pressurized water reactors, boiling water reactors, and organic moderated and cooled reactors. Order NYO-9400 from OTS, Department of Commerce, Washington 25, D. C. Price: $3.50.

IF HANFORD REACTOR POWER is assured in late 1964, "the short-term excess of power now available in the Pacific Northwest could be marketed on a long-term basis immediately," in the opinion of FPC, the Interior Department and BPA. Secretary Udall has admitted that Hanford was not indispensable to a public power grid in the Northwest and California. (JCAE statistics on Hanford are that the "most economic" electrical plant would have a capacity of 650,000-kw when operating as a dual purpose reactor for the production of plutonium and byproduct power and 760,000-kw when operating for power purposes alone. Estimated cost is $95-million. Present plan for completion of Hanford reactor is October, 1962, but schedule for addition of electrical facilities is October, 1964. This means two years of plutonium production alone before byproduct power is generated.)



Ten steam generator units like this 170-ton assembly, being built by Combustion Engineering, Inc., under a $4.3-million contract, will produce steam at the plutonium-power production facility at Hanford, Wash. (See story about NPR conversion on page 53.)

The man who buys coal for an electric utility knows that he must think about 1981 as if it were a lot closer than 20 years away. Because the contract he signs today must embrace his company's coal needs for many years to come. It must contain answers to questions like these:

Can we count on an uninterrupted supply of the kind of coal we must have? Is this coal laden with hidden incremental costs over and above its invoice price . . . in excessive coal and ash handling, equipment outages, freight charges on inerts, and other operating inefficiencies? Or is it coal that will make our burning equipment operate at *highest* efficiency, delivering steam at the lowest possible cost?

Island Creek's approach to these questions shows the same long-term thinking applied by utilities themselves, and the answers are reassuring indeed. We'd welcome a chance to tackle *your* 20-year queries. Write, wire or phone to arrange this important discussion.

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WASHINGTON OUTLOOK

BY RALPH ELLIOTT
WASHINGTON EDITOR

NPR—Another New Johnsonville

Of the many New Frontier storm clouds gathering over investor-owned utilities, "NPR" is one of the most alarmingly ominous. It stands for the $145-million New Production Reactor now under construction at the government's vast plutonium-for-weapons production facilities at Hanford, Washington. The drive is on to convert this reactor to the generation of 700,000 kw of power for the Bonneville system.

NPR has become the symbol of a crusade by government power expansionists to gain a federal thermal plant breakthrough in an area other than the Tennessee Valley.

TVA's first steamplant, New Johnsonville, came about in the early 1940's under extreme pressure of a war emergency. Even so, it was battled to the utmost by those who foresaw what this precedent would lead to: a predominantly thermal-powered system with an assumed utility responsibility to meet all of its area's power needs, but largely free of regulatory and taxpaying responsibilities.

Now comes the question whether the same thing will begin to happen this year in the Pacific Northwest—and probably later in the Missouri Valley and other regions where the government has a solid hydropower foothold. The answer will soon be squarely up to Congress.

Viewed realistically, the conversion of NPR to a power producer will be hard to stop. The stage for it was set in 1958 when Congress, acting on the recommendation of the Atomic Energy Commission and the Joint Committee on Atomic Energy, specified in its authorization that the reactor should be the convertible type. The main reasons were that conversion of the otherwise wasted heat to electric energy would lower the cost of plutonium production; also that convertibility would permit practical peaceful utilization of the reactor in the event that international disarmament agreements are entered into.

True, the understanding was clear from the debates in 1958 that Congress was not committing itself ever to convert the reactor, and that conversion would be contingent upon future congressional authorization and appropriations. But once the present administration spelled out its power policies and named the men to carry them out, there never was any doubt that conversion of NPR would be a "natural" for the administration to latch on to. And President Kennedy lost no time in asking Congress for $60 million to get the job, estimated to cost $95 million, under way. He has promised to make an all-out fight for it.

Proponents of quick conversion already are armed with studies, the principal one by the Federal Power Commission, purporting to show that the addition of an electric plant at NPR would be "economically favorable" under all of numerous assumptions and accounting bases considered. During the period 1964 through 1972 when it is proposed to operate the reactor for production of plutonium and power (and when less costs are allocated to power) the economics of dual-purpose operation are said to be "highly favorable"; while those of proposed power-only operation in the 25-year period thereafter (the estimated life of the reactor) are described as "break-even or moderately favorable," depending on bases and assumptions used.

According to the FPC study, the economic benefits of conversion over the lifetime of the reactor range from a few million dollars to over $200 million—again depending on the bases and assumptions. Cost allocations, and such cost elements as interest, insurance, and uranium-use charge make a wide difference in net benefits. Undoubtedly the administration's power men will be missing no opportunity to juggle these variable elements into a pattern that minimizes the power costs. Incidentally, the actual estimated costs of energy from the reactor are classified, on the ground that they reveal weapon production information.

Some samples of the kind of arguments that will be heard soon in support of NPR conversion appeared in the recent reply of Interior Secretary Udall to a request by Sen. Jackson, chairman of JCAE's Military Application Subcommittee, for information on the economics of the proposed Hanford steam-electric plant. Said Udall:

"The new Hanford reactor has incorporated in its design $25 million worth of heat takeoff equipment to be used in conjunction with an electric generating plant. Unless this plant is built this $25 million will be a total waste. . . . The Hanford reactor is needed along with power from Canadian storage in order for Bonneville Power Administration to serve new loads in the Pacific Northwest after 1964. Power from the Hanford steam plant could be instrumental in preventing a power brownout in the Pacific Northwest. . . . The reactor is the only new power resource available to BPA that can be brought into production in time to protect the area against critical water conditions."

That NPR will be used for getting the busy federal foot into two doors, came in the windup of Udall's letter: "Finally, its (conversion) value will be greatly enhanced by the construction of regional interties which will substantially increase the marketability of power produced by the Hanford steam plant."

Significantly, he later put it the other way around at a press conference, stating that availability of the Hanford power would make a Bonneville-California intertie "almost essential."

Any way you look at it, NPR adds up to a gloomy picture for private-enterprise utilities in the Northwest. It also mirrors a broader picture: With the kind of inter-regional, giant power master-planning going on in Washington, power companies far distant from federal power strongholds can no longer look to distance as a long-range protection from government competition.

ENGINEERING-OPERATIONS

Model Furnace Gives "Stitch in Time"

Small puffs or big bangs in furnaces are being headed-off by Consolidated Edison through an education program using a model furnace. The model demonstrates why and how puffs occur when a furnace is operated incorrectly. Built by Fritz J. Lennox, superintendent of production at Con Ed's Arthur Kill station, it has been on tour of all of the company's generating stations where it has been used to remind operators of the potential dangers of improper furnace operation, especially during the light-off period.

Con Ed's production dept. believes that a stitch in time saves plenty. While the company has not had a major explosion of fuel in a furnace for many years, the possibility is always there.

Mr. Lennox first demonstrated the model at Waterside station for the supervisory personnel there. He noted that an industry committee has "put the finger" on furnace explosions as potentially the most costly occurrences in generating stations, and that most such explosions can be traced to human failure. "No mechanical means is more effective than the efficient operator," he said. Once an operator made a mistake, the best thing to do was to start from the beginning and purge the furnace again.

Mr. Lennox demonstrated the correct or normal way to light off a furnace. Following that, he "blew" the lid off the model several times to illustrate what happens because of delayed ignition, inadequate ignition energy, fuel interruption, or air interruption. These are common situations confronted by all operators. He also brought out the seriousness of fuel accumulation in a down furnace.

Pad-Mounted Transformers Get More Flexible

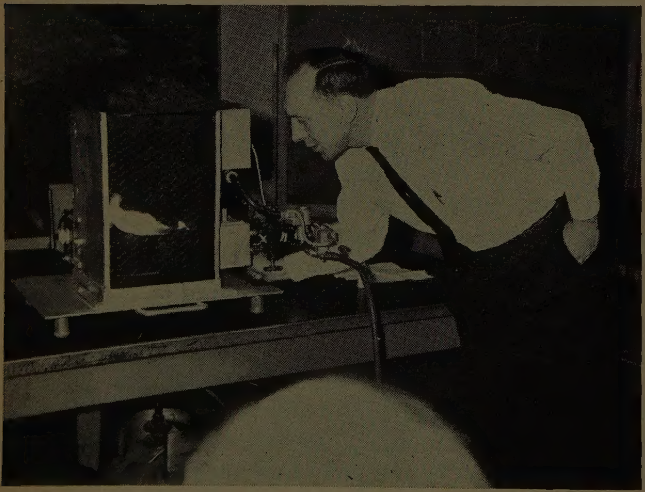
Switching and protection of pad-mounted transformer underground distribution systems has to be safe, flexible, and economic for the underground trend to continue, said Henry J. Barta, S & C Electric Co. to a recent Pacific Coast Electric Assn. meeting. He described new, improved, pad-mounted gear with components for switching and fault protection for single- or three-phase applications. The gear uses equipment and practices already available.

Pad-mounted transformers used with modular switching and protective devices retain the overhead, in-air operating and safety practices familiar to installation and maintenance crews. The modular gear meets all operational and safety requirements. The flexibility of the modular concept adapts to practically any type of distribution system, whether it be single-phase grounded wye or delta or three phase.

Little Gypsy Steams Up

Little Gypsy, Louisiana Power & Light's and the world's first steam-electric unit capable of fully automatic operation has been operating since March 30. The Daystrom Systems computer control system has been incorporated to maintain a high degree of efficiency and safety of operation.

The computer will monitor automatically approximately 700 temperatures, pressures, flow rates, and valve and switch positions continuously. The plant is also equipped with Panellit's solid state annunciator system.

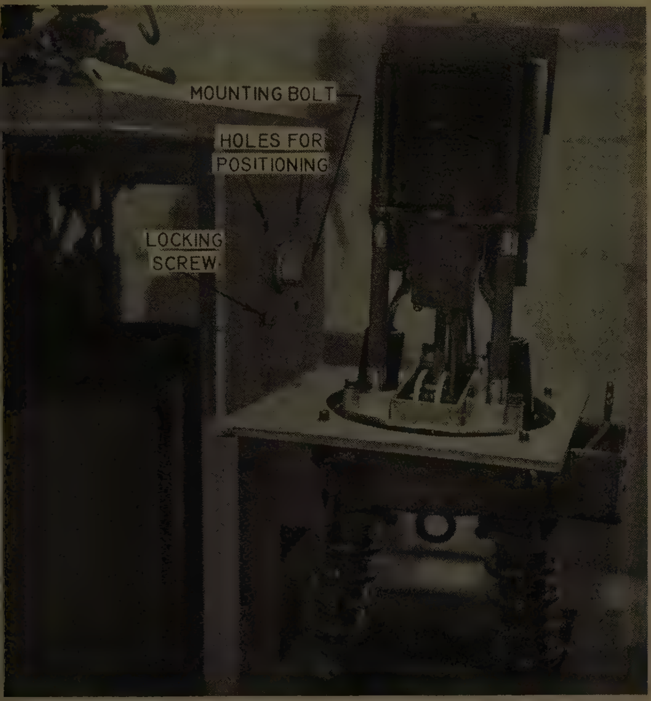


At left, Mr. Lennox demonstrates to supervisory personnel at Con Edison's Waterside Station, how to light furnace correctly with model he built. At right, furnace lid flies high as puff blows it off. Mr. Lennox showed how this would happen if a furnace were to be operated incorrectly. Use of the model for demonstrations provides "safety insurance" for operators.

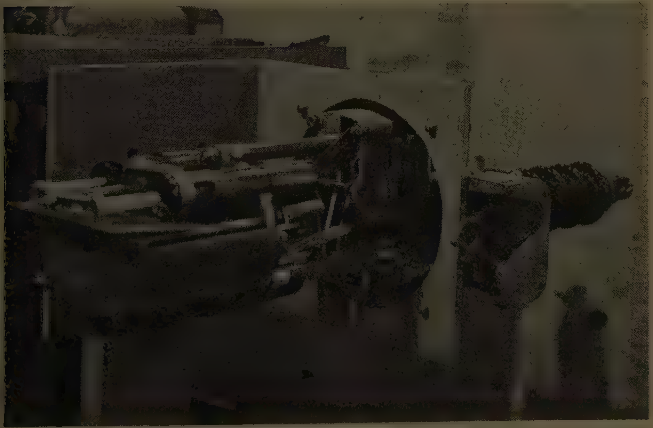
Bracket Aids Recloser Maintenance

By RAY C. JACOT, Foreman
Division Substation Dept.
Indiana & Michigan Electric Co.
Fort Wayne, Ind.
AEP System

An easily-made bracket permits a recloser or sectionalizer to be positioned at various angles to facilitate cleaning, inspection, and other types of maintenance. It can be set to the position that permits easiest mounting of the recloser and then turned to positions that facilitate each step in the maintenance procedure. Cost is about $20 when built from scrap materials, and the bracket takes very little space compared to a special stand.



Recloser on bracket inverted to show simple details of mounting arrangement. Center bolt through frame of recloser storage rack supports the weight and permits rotation to selected angle. Small cap screw locks bracket in position during maintenance. Note pan below to catch oil drip.



Horizontal positioning of recloser simplifies maintenance work on mechanism. Formerly, recloser had to be laid on its side for some of the work.

Because of the ease of cleaning and inspecting reclosers with this bracket, savings are estimated at 75 manhours per year at Fort Wayne Division, based on an average of 150 units handled annually. In addition, this safe, versatile method of positioning has encouraged improved workmanship in the cleaning and maintenance of reclosers and sectionalizers. And if a workman is temporarily called away from his job, the apparatus cannot fall from this fixture as it might from a bench. The bracket can be modified to support various-size reclosers or adapted for work on other types of equipment. In our shop, for example, a series of adapter rings was made so the same bracket can be used for all sizes of reclosers, sectionalizers, and NR capacitor switches.

The 90-degree bracket was made from scrap steel plate, ½-in. thick. Dimensions of the welded angle are 14-in. across, with a 14-in. leg for mounting on the rack and a 15-in. leg for supporting reclosers. The mounting hole is for a 1-in. bolt, and 9/16-in. diameter holes were drilled for the locking screw to fix the assembly in four positions—upright, inverted, and horizontal in either direction. While it is not a problem when rotating assemblies as light in weight as this, a certain amount of care should be used to place the pivot point somewhere near the center of gravity for the mounted units. This minimizes rotational unbalance and makes the unit easier to handle in all positions.

Give Salvaged Poles Second Chance

Saskatchewan Power Corp.'s pole reclaiming program, started last year, will result in considerable pole-cost savings. Poles salvaged from old-line reconstruction were previously discarded or sold for a nominal sum to cover cost of handling. They are now being reclaimed and put back into service at approximately half the cost of new poles. During the first month of reclaiming—November, 1960, 473 poles were reconditioned.

From SPC yards, poles that are believed reconditionable are sent to Northern Wood Preservers at Prince Albert, contractors for the Saskatchewan Timber Board. There, they are machine peeled, to remove surface rot caused by gaffs and weather after being checked for heart rot, fractures, etc. The next operation is full length penta pressure treatment half an inch below the surface.

Of 9500 poles sent to the reclaiming plant, some 2200 have been returned to SPC. Some of these have been used in line rebuilds, others sold to rural telephone companies and others placed in readiness for future use. Poles unsuitable for reclaiming are given to farmers for use as fence posts or fuel.

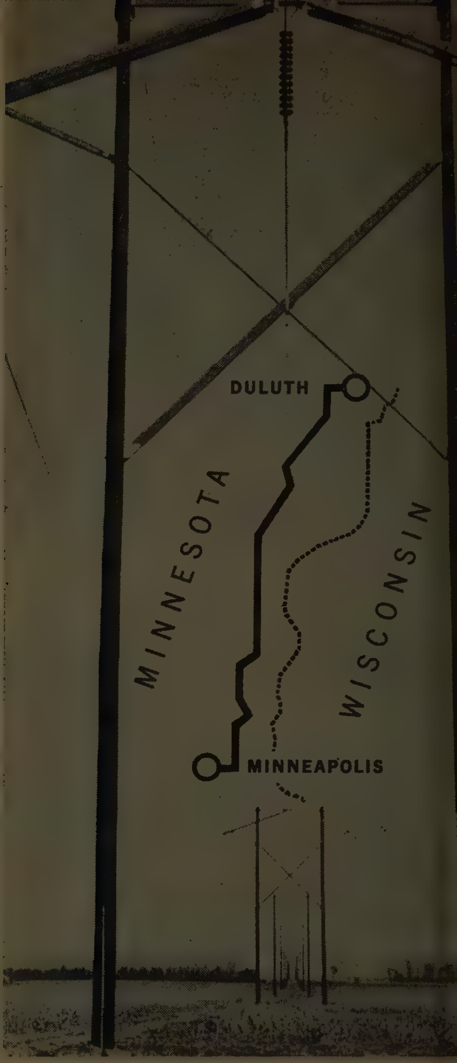
It is estimated that the present pole yard storages will provide between 14,000 and 15,000 poles for reconditioning.

The idea originated with Bell Pole Co., of Minneapolis.

UPPER MISSISSIPPI VALLEY POWER POOL

150 mile 230-kv interconnection integrates Minnesota's Head-of-the-Lakes area into new five-system pool in Upper Midwest.

By SETH N. WITTS, Supervisor, Power Pool Activities,
Northern States Power Company



RIGHT-OF-WAY acquisition and design by use of a digital computer are now in progress for construction of a 150-mile, 230-kv transmission line in Minnesota between Duluth and the Twin Cities of Minneapolis and St. Paul. This line-building project, shared by Minnesota Power and Light Co. and Northern States Power Co. in equal lengths, will effect a major interconnection long sought by both companies.

The new line will be of wood-pole K-frame construction and will terminate in established 115-kv transmission networks at each end through 166,667-kva, 230/115-kv transformers. Total project cost is $8,300,000.

Minnesota Power and Light Co. is located at the head of the Great Lakes and serves the northeastern and central portion of Minnesota, including the iron-mining areas of the state. It has remained electrically isolated thus far from similar utility systems because of wide geographic separation.

With completion of the new solid-synchronizing tie to Northern States in 1963, Minnesota Power and Light will become part of a network of systems already operating interconnected in the surrounding areas. Supplementary ties into such areas and to still other systems then will be made possible. Those will afford additional savings through avoidance of duplication of separate facilities otherwise required by individual systems to cover load growth.

Studies of other potential interconnections between these Minnesota systems, at points much closer together than Duluth and the Twin Cities, have been made at intervals for more than 25 years in the hope of proving economic feasibility. Such ties, however, would have been at lower voltage between points relatively remote from principal sources of power. Without being paralleled by a high-capacity interconnection capable of handling large interchanges of power between major centers of generation, the lighter ties proved impracticable.

Formal Power Pool Organized

Coordinated advance planning of both transmission and generation by a group of five neighboring power suppliers has made possible a new power pool now formed in the Upper Midwest area.

Four investor-owned electric utilities and one REA-financed electric power cooperative, all with extensive systems of generation and transmission, have joined together under a formal operating agreement known as the Upper Mississippi Valley Power Pool.

The new pool group includes Interstate Power Company, Dubuque, Iowa; Dairyland Power Cooperative, La Crosse, Wisconsin; and Otter Tail Power Company, Fergus Falls, Minnesota, in addition to the two now to be newly interconnected — Minnesota Power and Light and Northern States.

Coordinated Planning Makes Pool

A coordinating study made in 1959 of the independent plans of the five systems now joined, disclosed a generating-capacity situation ideally suited to pooling. Under the independent plans, the total generating capacity of the group in 1963 would exceed a 12-percent margin of reserve by more than 200,000 kw.

The large reserve of the group was typical of independent planning. Each system had taken a conservative approach as to security of service. Minnesota Power and Light, because of no ties to other systems, had a special problem in that respect. This company was reaching ahead in size of generator units to gain reductions in capital and operating costs afforded by larger units, thus swelling their reserves.

Also, Northern States Power Company independently had planned installation of a 200,000-kw steam turbine generator in 1963 at its Riverside Plant. By pooling reserves of this group, the intended 200,000-kw unit for NSP obviously will not be needed in 1963.

12-Percent Pool Reserve

A reserve of 12-percent was considered to be reasonable for this group when adequately interconnected and pooled under a formal working agreement. The group supply for 1963 will use the excess capacity of Minnesota Power and Light, Dairyland Power and Interstate Power to cover the needs of Otter Tail and Northern States. Economic justification for the Duluth-Twin Cities tie thus was provided, which on a two-company basis alone had never been found economically feasible.

$4-Million Savings

Savings in fixed charges from delay of the intended 200,000-kw generator unit of NSP for one year will exceed $4-million. By purchase of excess capacity in 1963 from the three systems in the amounts needed to meet reserve requirements, Otter Tail and Northern States will provide a market not otherwise existent for those excesses. The savings created by the pool thus will be shared by all of the members.

The net generating capability of the systems in the Upper Mississippi Valley Power Pool including units now scheduled for 1963, will be 3,225,000 kw, as follows:

Dairyland	308,000 kw
Interstate	346,000 kw
Minnesota Power & Light	523,000 kw
Northern States	1,870,000 kw
Otter Tail	178,000 kw
	3,225,000 kw

Background of Pool Agreement

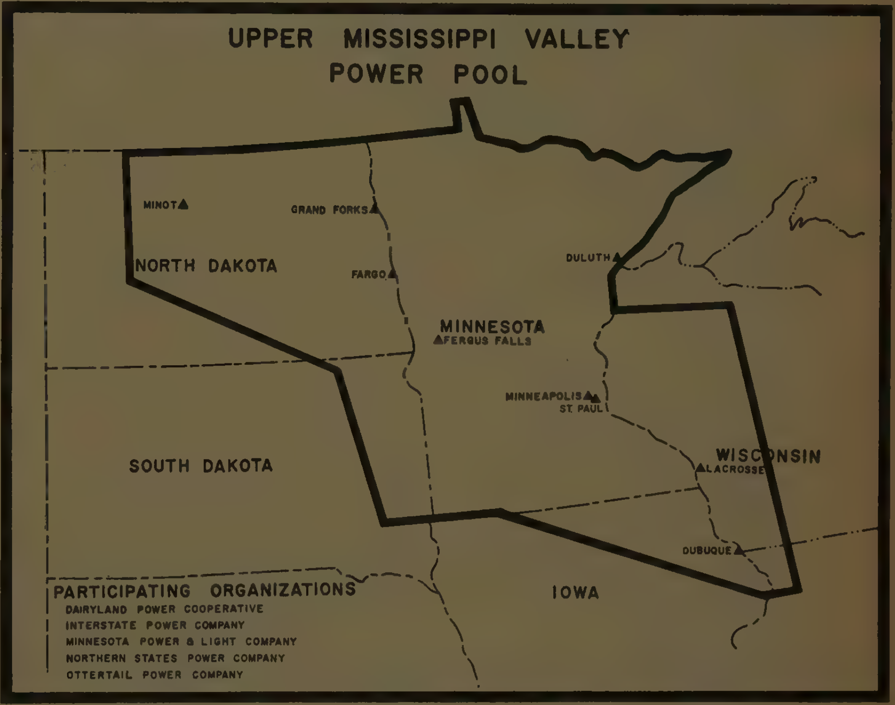
All of the pool members are also active in the workings of the Eastern Missouri Basin Power Conference. This is a voluntary association of electric power suppliers of the Eastern Missouri Basin area, which has promoted the pooling of electric power systems since its organization in January, 1957. Its membership includes thirteen power cooperatives, four Federal power agencies, two municipal electric utility associations, three public power districts of Nebraska, and twelve investor-owned electric utility companies.

To implement a plan for a 6,000,000-kw pool of all the systems of the Eastern Missouri Basin, the EMBP Conference, in May, 1958, set up a properly representative five-man full-time task force to prepare a pool agreement. After many reviews of successive drafts, the engineering committee of this organization finally accepted a formal agreement in April, 1959.

Although the Basin-wide pool plan proved too unwieldy to be accepted as such, the formation of a number of sub-area pools was recommended. The Upper Mississippi Valley Power Pool is the first of those completed.

The pool agreement of the Eastern Missouri Basin Power Conference, as issued in 1959, is generally suitable with relatively little change

(Continued on page 93)



UPPER MISSISSIPPI VALLEY
POWER POOL

SERVICE SCHEDULES

Equalization Firm Power Interchange
Equalization Seasonal Firm Power Interchange
Emergency and Scheduled Outage Interchange
Spinning Reserve Interchange
Economy Energy Interchange
Wheeling Services and Losses

Table I—Pool Services Interchanged.

DIAGNOSIS OF PILC CABLE FAILURES HELPS PREVENT OUTAGES

After locating a cable fault, the Boston Edison Company starts an extensive analysis to determine "why."

By WALTER D. BULLOCK, Engineer, Technical Service Division, Transmission and Distribution Department, Boston Edison Company

THE key to the successful underground cable program at the Boston Edison Company is "The Morgue"—a name given to the department that analyzes all cable failures. The fault-analysis group is not concerned with who is involved in the installation of cables or the making of joints, and refrains from any comments on these matters, but has only the technical aspects of the failure in mind. This separation of aims tends to assure a factual determination of the causes of failures.

This article pertains primarily to paper insulated, lead covered, duct-lay cables. However, the same general methods of analysis will apply to buried or submarine, and for that matter, aerial sheathed cables, as long as they are paper insulated.

Field Analysis

Briefly the steps used to diagnose or analyze a cable, joint or termination failure are as follows: After locating the fault, a field moisture and sheath analysis is made to determine the extent of the repairs required prior to putting the line back in operation. This may allow a permanent repair close to or at the point of failure and, thereby, result in the nonsubmission of fault for further analysis.

The field analysis is conducted by the person who is responsible for determining the repairs necessary. This person, after considering the mechanical problem presented by the failure, decides the repairing or replacing job necessary to get the cable back in service. He must then determine if the insulation adjacent to the fault or at the end of the cable sections not removed is dry.

To determine if moisture is present, a simple test is made which consists of immersing samples of the paper in petrolatum heated to 290° F and noting the presence or or absence of bubbles. The bubbles are formed by the moisture absorbed in the insulation or on the surface of the paper vaporizing into steam and coming to the surface of the petrolatum. Surface moisture is accompanied by a crackling sound. The amount of moisture present will be indicated by the degree of bubbling. If a substantial amount of moisture is present, there will be foaming of the petrolatum.

The distance necessary to cut back on the cable, if piecing-out a failure, is determined by testing the insulation at successive cuts, until moisture tests show no bubbling. The Boston Edison Company has a rule that no moisture can be evident in this test at the limit of the replacement area.

The conditions surrounding the fault are noted and recorded for background material during further investigation. Some of the pertinent details that are of interest are the physical location of the fault, whether the cable was fireproof correctly, what type of fireproofing was used, whether the joint sleeve was taped with rubber if used with jacketed cable, which duct the cable was located in and any other interesting features of the location. All this information is recorded on a printed form.

The Morgue

If the fault is not destroyed in making the repair, it is cut out of the cable and sent to a location established for the analysis of equipment and material which has failed in service.

Identification tags are used for attachment to the fault to identify it with the line number, date and general location of failure and the name of the person who located it. If this procedure is not followed, a poor analysis is the inevitable result. The storage area is convenient to the location at which the dissection takes place. This area is kept clean and dry to prevent moisture or foreign materials from entering the fault which might give rise to incorrect conclusions.

The scene of the final dissection of the fault, in the jargon of the BECo., "The Morgue," is a separate area equipped with the usual tools that a splicer uses, and, in addition, there are available a micrometer with a ball anvil to measure sheath thickness, a diameter tape, calipers, and an IPCEA lead-bending machine to check condition of sheath samples.

Also, the morgue has a propane furnace to heat petrolatum for moisture testing, a thermometer and a good ten power magnifying glass which is used to determine many interesting things concerning sheath condition, paper damage and conductor irregularities. There is also available a *complete* set of standards on construction of joints and specifications for cable and the forms for recording the analysis data.

Cable Analysts

In BECo., the group that analyzes all cable failures consists of three persons. One member is from the Engineering and Construction Department (Technical Methods Division) whose primary interest is the design of the splices involved. Another member is from the Engineering Department (Testing and Standards Division) whose usual work includes cable salvage and acceptance inspection, and whose primary interest is conditions affecting cables. The third member of the group is a member of the Transmission and Distribution Department (Technical Service Division) who is interested in obtaining operating data as well as determining the adequacy of instructions for work methods and workmanship for the field forces.

The group operates as a whole

while dissecting a fault, and any member will do the mechanical operations of removing sheath, tape inspection or moisture analysis. If there is a question of improper or nonstandard workmanship, the Cable Division is invited to have an observer present for matters concerning the work of their employees.

In the morgue, the external covering, the insulation and the conductor are studied independently of the repair work for restoration of the line. After determining the facts by tests and by examination, a cause is assigned and the results, while they cannot help in this particular failure, become statistics which are of value both to the Company and the electrical utility industry as a whole.

Recording Data

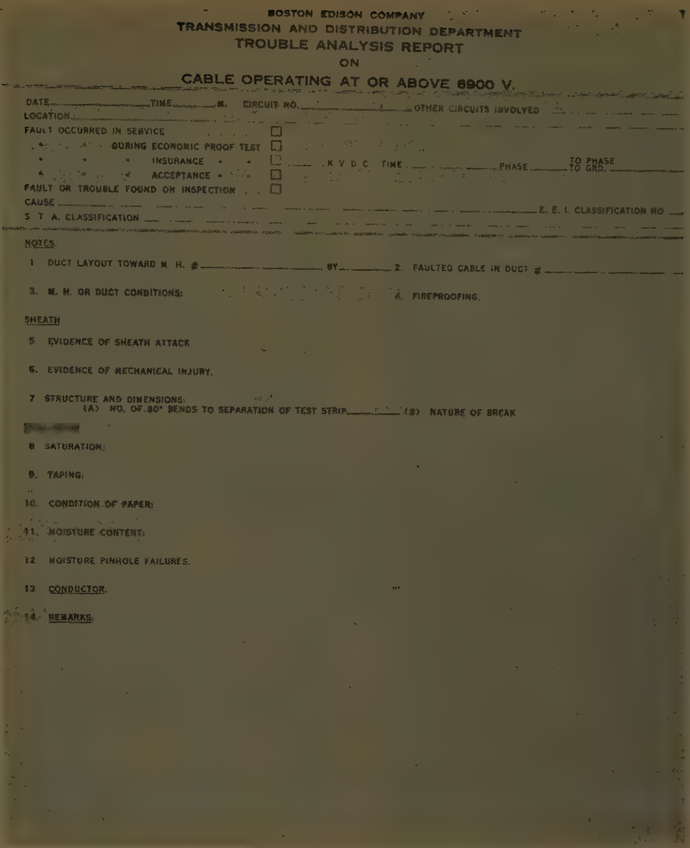
To record the facts surrounding a failure, a form is completed both to allow statistical analysis and to insure that all pertinent facts are entered. The front of this form is shown in Fig. 1.

The top two lines of this form have to do with the identification of the failure, the next five lines determine the conditions under which it occurred. The cause and EEI Classification are determined and are filled in at the time of the analysis.

The following section is concerned with the conditions encountered in the field. These data are obtained from the person who was in charge at the time of replacement. The next section deals with the sheath and various factors affecting it. This is followed by a section where the insulation is considered. The headings listed are: Saturation, Taping, Condition of Paper, Moisture Content, Moisture Pinhole Failures, Conductor and Remarks. The "Remarks" area is where the most informative material usually appears because this is where the abnormalities are recorded which do not appear in the routine entries above.

Fig. 2 is the reverse side of the form shown in Fig. 1. It is headed by a form sketch of three manholes so that the fault can be located with respect to the manholes.

Below this sketch is a pictorial representation of a cable on which is sketched the dimensions and gen-



BOSTON EDISON COMPANY
TRANSMISSION AND DISTRIBUTION DEPARTMENT
TROUBLE ANALYSIS REPORT
ON
CABLE OPERATING AT OR ABOVE 6900 V.

DATE __________ TIME ______ M. CIRCUIT NO. __________ OTHER CIRCUITS INVOLVED __________

LOCATION __________

FAULT OCCURRED IN SERVICE ☐

" " DURING ECONOMIC PROOF TEST ☐

" " " INSURANCE " " ☐ ______ K V D C TIME ______ PHASE ______ TO PHASE / TO GRD. ______

" " " ACCEPTANCE " " ☐

FAULT OR TROUBLE FOUND ON INSPECTION ☐

CAUSE __________ E. E. I. CLASSIFICATION NO ____

S T A. CLASSIFICATION __________

NOTES.

1 DUCT LAYOUT TOWARD M. H. # __________ BY ______ 2. FAULTED CABLE IN DUCT # __________

3. M. H. OR DUCT CONDITIONS: 4. FIREPROOFING.

SHEATH

5 EVIDENCE OF SHEATH ATTACK

6. EVIDENCE OF MECHANICAL INJURY.

7 STRUCTURE AND DIMENSIONS:
(A) NO. OF 90° BENDS TO SEPARATION OF TEST STRIP ______ (B) NATURE OF BREAK

[redacted]

8 SATURATION:

9. TAPING:

10. CONDITION OF PAPER:

11. MOISTURE CONTENT:

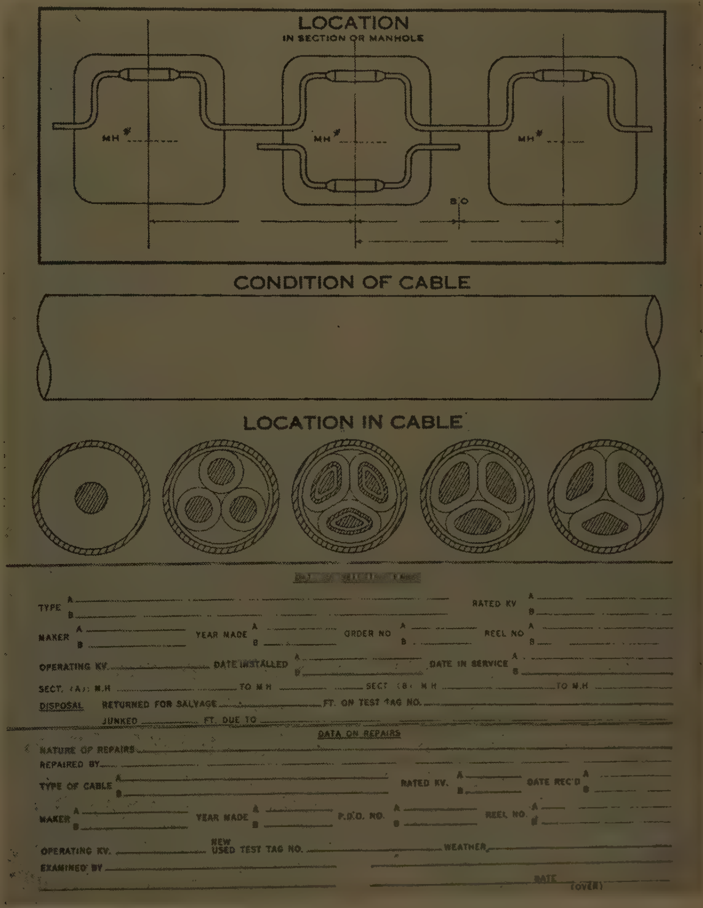
12 MOISTURE PINHOLE FAILURES.

13 CONDUCTOR.

14. REMARKS.

Fig. 1—Front of the form used to record pertinent facts of a cable failure. The identification of the failure, conditions encountered in the field, sheath and insulation condition and remarks—where the most informative material usually appears—are included on this form.

Fig. 2—This is the reverse side of form shown in Fig. 1. Data recorded here mainly concerns the type and general description of the cable and fault.



LOCATION
IN SECTION OR MANHOLE

CONDITION OF CABLE

LOCATION IN CABLE

[redacted]

TYPE A __________ B __________ RATED KV A ______ B ______

MAKER A ______ B ______ YEAR MADE A ______ B ______ ORDER NO A ______ B ______ REEL NO A ______ B ______

OPERATING KV ______ DATE INSTALLED A ______ B ______ DATE IN SERVICE A ______ B ______

SECT. (A): M.H ______ TO M H ______ SECT (B) M H ______ TO M.H ______

DISPOSAL RETURNED FOR SALVAGE ______ FT. ON TEST TAG NO. ______

JUNKED ______ FT. DUE TO ______

DATA ON REPAIRS

NATURE OF REPAIRS __________

REPAIRED BY __________

TYPE OF CABLE A ______ B ______ RATED KV. A ______ B ______ DATE REC'D A ______ B ______

MAKER A ______ B ______ YEAR MADE A ______ B ______ P.O.O. NO. A ______ B ______ REEL NO. A ______ B ______

OPERATING KV. ______ NEW / USED TEST TAG NO. ______ WEATHER ______

EXAMINED BY __________

DATE ______

(OVER)

Above, these are pinhole failures in paper tapes caused by moisture.
Below, preliminary stages of corrosion due to electrolysis caused by positive potentials.

eral shape of the faulted area. The cross-section views indicate types of cable used and the fault is sketched on the appropriate one. It is not sufficient to indicate only the type of cable because how many conductors were damaged and how much sheath was removed are also important factors and should be noted.

The types of cable shown are single conductor, three conductor round belted (as indicated by the inner circle under the sheath), three conductor split-sector belted, three conductor belted sector and, finally, three conductor shielded sector.

Immediately below types of cable are spaces titled "Data on Defective Cable" and "Data on Repairs." These are completed from clerical records. At the bottom of the form, is a place for the signatures of the examining group.

Analyzing Cable Failures

To begin the analysis of a cable failure, the specimen is laid out on the bench, and the examination begins from the outside. The sheath is examined closely, to determine any pulling scars—bright clean ones indicate that these probably were made on pulling out.

A check is also made to determine if any pebbles are embedded in the sheath as these are indicative of the condition of the ducts before the installation of the cable. Pebbles may cause holes in the sheath because of continued rocking as the cable expands and contracts. Any peculiar stains are noted and an attempt made to determine the cause as these may be indicative of cathodic electroylsis or chemical attack. Sheath cracks are also looked for and the appearance noted. These may indicate expansion and contraction if they are circumferential, or, if they are random, they well could be due to vibration crystallizing the lead.

The sheath is then cleaned using rags and a solvent and it is inspected for corrosion. If any pockmarked areas show up, a wire brush is used to further clean the surface so that it may be examined closely for pits.

With the examination of the sheath completed, the results are recorded on the part of the form titled "Evidence of Sheath Attack" and "Evidence of Mechanical Injury." After this, the sheath is opened carefully and inspected on the inside surface. The major thing to look for here is the presence of water stains, which are grayish and cannot be removed by rubbing with a dry cloth. It takes water a considerable time to stain the lead, so this is definite evidence that moisture was present before the failure occurred. This is noted under the "Remarks" section on the form.

A sample from the sheath is taken at a place where it was not damaged and placed in the IPCEA lead-bending machine. This machine applies a tension on the lead and as it is bent the number of 90° bends it took to fracture the sheath is observed and recorded on the form provided. Twenty-five to forty bends is the usual range necessary for fracture. The appearance of the fracture gives a clue as to the condition of the sheath. If it is sharp and clean, the lead is good; if it is crystalline or laminated, there is a possibility that it was not of the best lead or had impurities included at the time of manufacture.

The manufacturer usually puts an identification tape over the insulation but under the sheath. This tape gives the date of manufacture and the maker. This information is recorded under "Data on Defective Cable" which is on the back of the form—see Fig. 2. Next, the fillers between the sectors are removed and placed in the hot petrolatum to check for moisture content. Even though water may have been seen, the fillers are checked to determine if this water is only at the fault location and may have entered after the failure.

The insulation is removed from the damaged conductor by unwrapping individual tapes, checking for overlap of the layers and moisture as we progress toward the conductor. The amount of cable oil will be apparent and this is recorded under "Saturation." Also, if there are any "pinholes," this is noted. These are small holes formed at and near the fault when moisture is present in the insulation for a period of time and the layers of tape break down individually. The pinholes may all be destroyed when the cable fails, but occasionally they are present in the cable at a short distance from the failure.

As the tapes are removed, the analyst watches for wrinkles which may leave voids that ionize and start breaking down the insulation. Also, if two adjacent tapes have their edges in line the value of one layer of tape will be lost at that point.

When all tapes have been removed, the conductor is examined for sharp ridges that may have been left by the compacting dies and which might have cut through the shielding tape to leave a high-stress point. This would cause progressive failure of the tapes from the conductor outwards. Of course, the failure may have destroyed much of the conductor, paper tapes and sheath at the immediate fault location, but in the adjacent cable there may remain similar incipient evidence to give a clue as to what possibly might have occurred to the cable at the fault.

Analyzing Joint Failures

A similar procedure is followed when analyzing a joint failure. To qualify as a joint failure, a fault must occur in the area included between the extremes of the wipes at either end of a sleeve over a splice. The BECo. uses a separate form to record data from the joint-failure analysis. It is similar to the form used for cable failures except that it is designed for joint failures.

The procedure in analyzing a joint failure is somewhat the same as a cable failure. First, the sleeve is inspected for mechanical damage or electrolysis. In this case, electrolysis is possible due to galvanic corrosion of dissimilar metals. Attack by the alkalis in the fire-proofing cement used in earlier years is often another cause of corrosion. The general appearance of the sleeve will indicate whether it swelled due to hydrostatic pressure of cable oil, which may occur at the bottom of a hill.

The seals on the filling holes of the sleeve are checked and the wipes are examined to see if they are well made. Special note is taken to determine if the sleeve was properly beaten down to the cable size.

After recording results of the outer inspection, the sleeve is removed with a chipping knife. Special precaution is taken to prevent heating as much as possible so that any moisture present will not be dried out. The filling compound is tested for moisture and checked for voids caused by incomplete filling. If compound had dissolved in the cable oil, it is recorded.

With the sheath removed, a method of checking the filling-hole seals is to put a solvent inside of the sheath and watch for its appearance outside. Of course, only the immediate area of the seal needs this treatment. Likewise, if the wipes appear poorly made and can be removed from the cable ends, they are filled with solvent and set aside to see if the solvent will leak out. The wipes may also be sawed apart to determine if there is a void extending from the inner side to the outer surface.

After checking the compound on the joint and noting filling voids, the compound is removed and the construction of the joint itself is exposed. The dimensions of the joint are recorded and at the same time compared with the standards. Some of the pertinent points measured at this time are the length of the total joint, the length of the stress cones and the outer diameters at the high point of the stress cones and over the connectors for the conductors.

The joint is taken apart and the condition of the hand-applied and factory insulation noted similarly to the method used with cable insulation. When this has been noted and recorded, and the connector on the conductors has been exposed, it is examined to see if it was properly soldered and smoothed. There should *not* be small sharp points of solder near the ends of the connector as these give high stress points as well as possible sources of mechanical damage to the insulation. The dimensions are again measured and compared with the standards to make sure that the joint was properly made. These results are recorded.

Analyzing Pothead Failures

The same general method of analysis as for cable and joints is followed when analyzing pothead failures. The joint-failure record form is used to record the data pertinent to potheads. Seals and wipes are inspected for possible paths of moisture entrance. If the porcelain body is cracked, it will be examined carefully. If the pothead is not damaged and can be reused it is heated enough to pull the conductor out. However, if this is done the tests for moisture external to the compound and voids in the compound are eliminated. The method used depends on the particular case. The insulation is checked for dimensions, moisture and stress cone formation as in a joint.

Causes Of Failure

So far the analysis has not indicated causes. This is deliberately avoided until all of the data is obtained on the failure. It may be well to point out that the causes of failures are not always readily apparent. One is tempted to jump to conclusions when he first sees a fault and may in reality diagnose an effect rather than a cause.

The mere fact that water is found inside a joint does not mean that it was there before the failure. It could have been because the joint was submerged at the time of failure. A cable that fails just inside the duct mouth may be due to sheath damage resulting from expansion and contraction, but it also may be due to electrolysis of the sheath. Therefore, it is apparent that a study of the fault is necessary for a realistic and logical conclusion as to the primary cause of failure.

Publication Q-7

A list of causes is tabulated and the characteristics of each have been published by EEI in their Publication No. Q-7, entitled "Recommended Procedure for the Diagnosis of Cable, Joint and Termination Failures." This publication is the Bible by which all analyses should be judged when determining the primary cause of cable failure. After all data concerning a failure have been recorded, a reference to Q-7 is advisable to see how many pertinent facts you have that correspond with the descriptions given in this publication. This will certainly lead you in the proper direction to determine the primary cause.

Common sense, all information available and powers of observation are used to decide on the primary cause of failure. After deciding on the cause, it is entered in the heading of the form for future reference and easy tabulation of statistics. In BECo. the numbers assigned in Q-7 are used for reference and have been found to be a good standard to use for statistics.

Fault-Analysis Benefits

There are definite benefits to be derived from fault analysis. These benefits come by studying data which have been collected over a period of time. Some of the useful results that can be obtained from a review of assembled data are:

1. Observing that there has been a repetition of cable failures in one location due to inadequate racking for the amount of cable movement experienced, remedial action may then be undertaken. Cyclical loading may be responsible.

2. Observing a high failure rate of joints, the design or workmanship may be reviewed to determine whether it is adequate.

3. Observing thta a high rate of failure occurs in one area due to electrolysis, proper steps may then be taken to prevent further failures.

These examples indicate some of the results that can be achieved

(Continued on page 92)

NEW TRANSFORMER DESIGN OFFERS SUBSTANTIAL SAVINGS

Recent AEP study shows possible potential savings of more than $650,000 over 10-year period by standardizing on a new distribution transformer having 2/1 copper-to-core-loss ratio. Elimination of the 15, 37½ and 75-kva sizes is not economical unless purchase costs are reduced an average of 7% on the adjacent sizes.

By W. H. JOHNSON,
Distribution Engineering Section Head,
and W. E. MEKOLITES,
Distribution Engineer,
American Electric Power Service Corp.

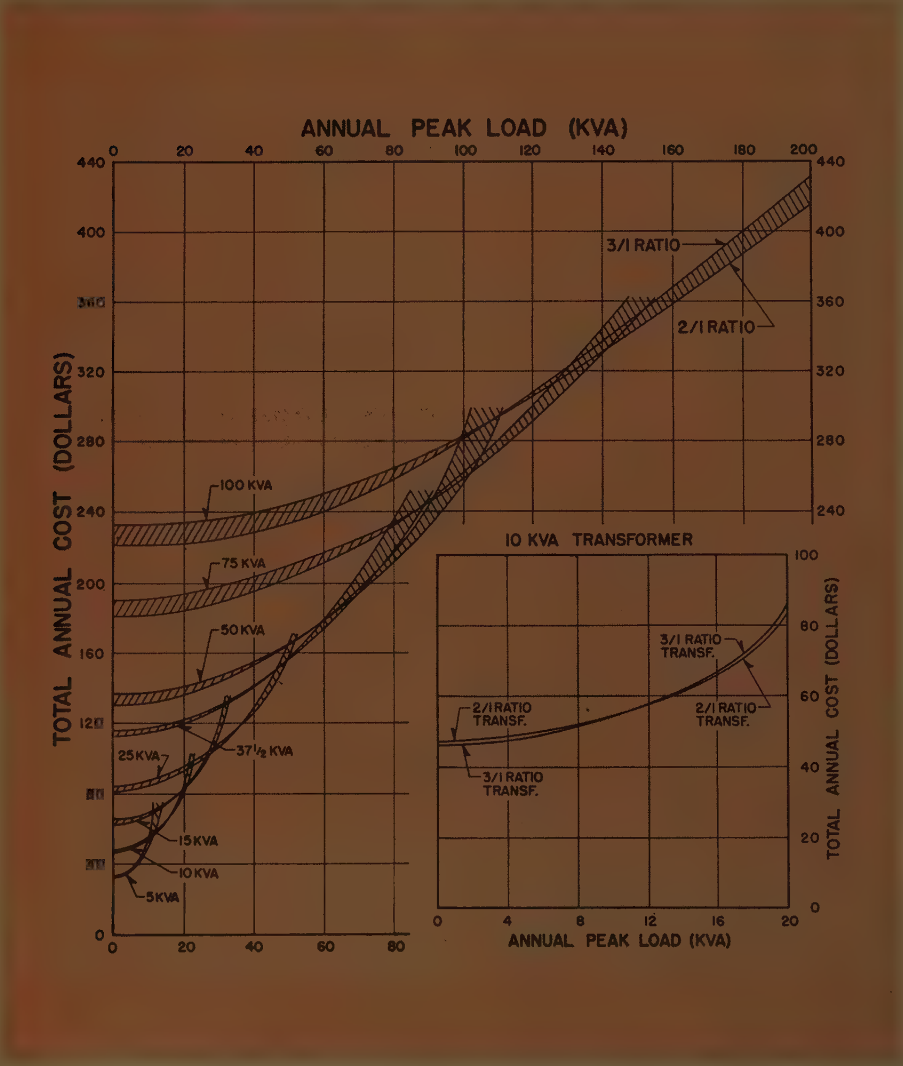


Fig. 1—Operating costs for various size distribution transformers comparing both the conventional 3/1 loss-ratio and the new 2/1 loss-ratio designs. Savings by using the 2/1 ratio transformer will increase with heavier loading up to the limit of 190% of transformer capacity.

ACCORDING to the results of a recent study, potential savings of more than $650,000 over a 10-year period will be possible for the utility purchasing and installing 10,000 transformers per year if a new distribution transformer design is used. This design is achieved in manufacture by increasing the core loss and decreasing the copper loss, which in turn results in a lower equivalent impedance for the transformer.

The conventional copper-to-core-loss ratio for distribution transformers has been approximately 3/1 for many years. In the new design, this loss ratio has been reduced to 2/1 with the sum of the losses remaining constant. In addition to the lower impedance created by the reduced copper loss, the cooling tubes have been removed from the new transformer to reduce manufacturing costs and an oil with a 15-deg C higher flashpoint used. These transformers therefore are permitted to develop a 65-C rise at rated load, 10-C higher than normal.

Because of this new design, all manufacturers of 3/1 ratio transformers are now guaranteeing no

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Editor's Note—This article has been adapted from a paper presented at the EEI T&D Committee meeting held in Philadelphia, January 18-20, 1961.

loss of life for higher periodic loads and have increased their nameplate ratings 10 to 12%. However, these higher thermal loadings offer no economical advantage for the 3/1 design where secondaries are involved, because the voltage drop limits the permissible loading range.

The comparison of two loss ratios for distribution transformers was made after examining various ratios from 1.75/1 to 3.25/1 in .25 steps. The same range of ratios was examined for three groups of transformers; one group having a constant product of losses (Cu x iron) as the ratio is changed; a second group having the sum of the copper and iron losses unchanged as the ratios are changed (the sum being the same as the present 3/1 ratio transformers); and the third group having constant iron losses with adjustment in copper losses to accomplish the different ratios. The result of this work provided confirmation that the 2/1 ratio transformer with the same total losses as the present 3/1 transformers provides the most economical annual operating cost for our System. Both designs are now being offered at the same prices. However, it is likely that the

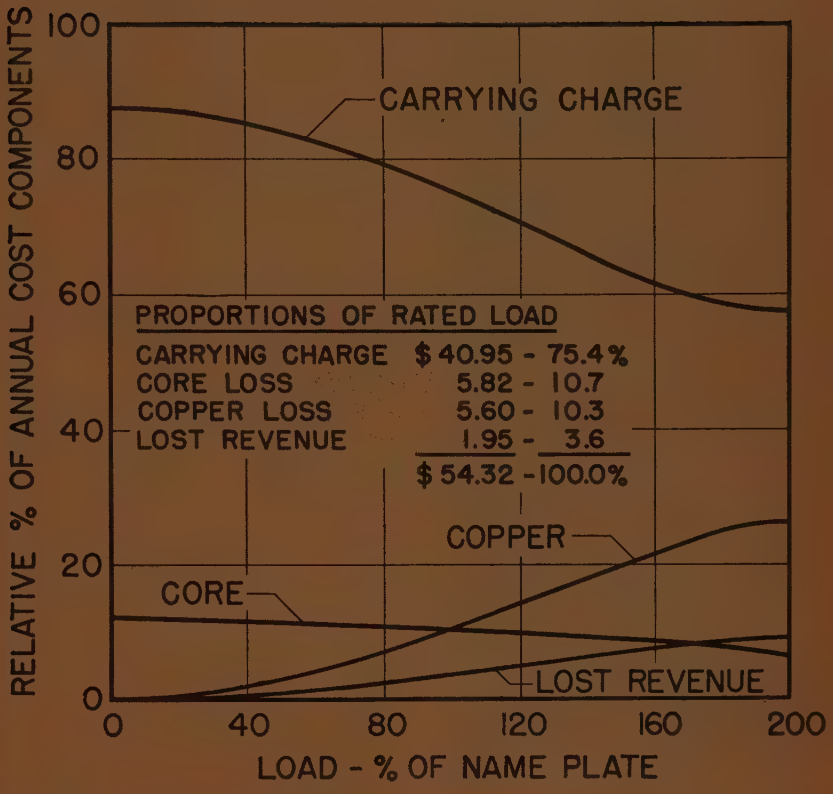


Fig. 2—Relative percentages for components of annual cost of a 10-kva 2/1 ratio transformer as a function of the load.

	2/1 RATIO		3/1 RATIO	
SIZE - KVA	RANGE - KVA	LIMIT	RANGE - KVA	LIMIT
5	0 TO 11	ECONOMICAL	0 TO 9.5	ECONOMICAL
10	11 TO 20.5	"	9.5 TO 15	VOLTAGE DROP
15	20.5 TO 28	"	15 TO 23	"
25	28 TO 49	"	23 TO 44	"
37½	49 TO 71	"	44 TO 62	ECONOMICAL
50	71 TO 108	"	62 TO 80	VOLTAGE DROP
75	108 TO 141	"	80 TO 125	"
100	141 UP	"	125 UP	"

Fig. 3—Permissible loading range for the transformers studied (voltage drop limitation = 3.5%).

important first cost will be reduced on the new 2/1 ratio transformer.

Explanation of Study

Since transformer losses result in a reduction of system capacity as well as a loss of energy, the loss ratio affects annual operating cost. To evaluate this effect, the total annual cost of both transformer designs has been calculated with results shown in Figure 1. The detail of the 10 kva transformer shows the typical variation of annual operating costs.

The most economical transformer loading range may be determined from these curves and is that kva range in which the annual cost of the transformer under consideration is lower than that of any other transformer. It was found that the 2/1 loss-ratio transformers are economical if loaded in the range of 125 to 190% of nameplate rating. If loaded in this range the savings realized will average almost $1.20 per year per transformer, compared with the 3/1 ratio transformers loaded in their economical range. This calculation was based on an average 25-kva unit and a load growth rate of 3%.

The relative percentages for components of annual costs as a function of load are shown in Fig. 2. Review of these curves reveals that carrying charges on first cost is by far the most significant component of total annual cost. Therefore, a transformer design leading to a reduction in initial investment will yield considerable benefits. The next most significant component in the normal transformer loading range is the cost of copper losses.

The permissible loading range for the transformers studied are shown in Fig. 3. It should be noted that the range for the 2/1 ratio is substantially higher than that of the 3/1 ratio design. The voltage drop limitation does not effect the 2/1 ratio transformer.

For the utility installing 10,000 newly purchased distribution transformers a year, the potential savings in operating costs in the first year alone will be more than $11,800. If the rate of adding newly-purchased transformers remains the same, these savings are cumulative and will be in excess of $650,000 over a 10-yr period. These savings in operating costs are calculated assuming equal costs for transformers of both designs. Any reduction in the purchase price of 2/1-ratio transformers will result in additional savings.

Conclusions

Here is a summary of the conclusions:

1. The 2/1 loss-ratio transformers are the most economical if loaded in the range of 125% to 190% of nameplate rating, yielding potential savings as indicated above.

2. Elimination of the 15, 37½ and 75-kva sizes, as has been proposed in some quarters, can only be justified by cost reductions for the other sizes. With present transformer costs, no economical justification exists for the elimination of any size transformer of either design. However, an average 7% decrease in the first cost of the 2/1 ratio, 25, 50 and 100-kva sizes will permit economical elimination of the 15, 37½ and 75-kva sizes. Excessive voltage drop at full economical capability does not occur.

3. The 2/1 loss-ratio transformer should be made a universal standard for all sizes. Our findings have been presented to the Transmission and Distribution Committee of EEI to enlist support from other utilities and encourge the manufacturers to make this design available.

Fig. 4—Present worth of savings realized by using 2/1 ratio transformers.

			LOAD GROWTH 3%	
SIZE-KVA	KVA RANGE INVESTIGATED	YEARS	PRESENT WORTH OF SAVINGS	SAVINGS / YEAR
10	9.5 TO 20.5	26	$ 19.60	$ .75
15	15 TO 28	21	58.75	2.80
25	23 TO 49	26	30.70	1.18
37½	44 TO 71	16	29.21	1.82
50	62 TO 108	19	84.00	4.42
75	80 TO 141	19	116.00	6.10
			LOAD GROWTH 6%	
10	9.5 TO 20.5	13	$ 16.25	$ 1.25
15	15 TO 28	11	30.25	2.75
25	23 TO 49	13	25.50	1.95
37½	44 TO 71	8	18.75	2.35
50	62 TO 108	9	75.25	8.35
75	80 TO 141	9	54.00	6.00

Need To Change Perspectives Told At The 23rd Annual American Power Conference

William F. Crawford, president of Edward Valves, Inc. and Republic Flow Meters Company, subsidiaries of Rockwell Manufacturing Company, opened the American Power Conference in Chicago with the suggestion that both manufacturers and users should change their perspectives.

Mr. Crawford pointed out to the more-than-3000 registrants in attendance at the conference that "Prices must include provision for research and development, field servicing, and training of owners' personnel by supplier people." He added that profitable companies are the ones that make technical progress. Mr. Crawford urged more anticipatory buying, fairer treatment of research expenditures by regulatory commissions and fairer taxation, depreciation policies in order to give the power industry the shot-in-the-arm it needs.

Utility Manpower Problem

Sherman R. Knapp, president of the Connecticut Light and Power Company and Edison Electric Institute, pointed out that the electric utility industry should continue to double every ten years for at least the next 20-25 years. Mr. Knapp added, "This will make the demand for well-trained manpower essential to our industry if we are going to adequately and efficiently fulfill our responsibilities to our customers."

The hiring rate for engineers in the industry dropped off markedly during the Thirties, and now we are going to have to catch up, according to Mr. Knapp. He mentioned that the reason why the utility industry is finding the manpower situation tougher than might be expected is due to the "glamour industries" born of the war, which have succeeded in attracting the major portion of recent engineering and scientific graduates.

Little Black Box

Mr. Knapp said that **"the fuel cell hidden in the closet of every home ticking off electric power is a long way off."** He mentioned that diversity factor is the greatest hurdle such a scheme has to contend with in upsetting the existing system of electricity supply. For instance, Mr. Knapp explained that it would take a gadget having a capacity of 10 kw to supply power for one electric range, but a central station of 60 kw could supply 100 electric ranges.

Atomic Regulation

George E. Drach, Illinois State Senator, pointed out that the problem of delegating the responsibility for Atomic Power Regulation is a delicate one because the Federal control involves nuclear weapons for defense and State control is based on public health and safety. To further complicate the situation, Federal control does not cover many radioactive items and products, such as: X-ray machines, fluoroscopes and similar devices, according to Mr. Drach. He mentioned that there are indications that the Congress has become aware of legal and constitutional impediments, and that procedural amendments may be made to the Federal Atomic Energy Act in 1961.

Looking Back At Management

At the All Engineers' Dinner, H. G. Ebdon, president Combustion Engineering, Inc., took his text from the first verse of the Book of Common Sense: "If a job is worth doing, it is worth doing well."

Mr. Ebdon believes that American industry has become overmanaged. He emphasized that when we need assistant vice-presidents, assistant managers, assistant supervisors, all of whom have assistants of their own, the communication channels become clogged and unnecessary paper work builds up. The overhead due to the "nonproductive worker" has been overlooked far too long, according to Mr. Ebdon. He pointed out that the aforementioned remarks concerned industry in general.

Photo taken at the luncheon on first day of the Conference. Left, Thomas Ayers, VP Commonwealth Edison Co. and Chairman of the opening session of the American Power Conference and, right, William Crawford, President Edward Valves, Inc. and Republic Flow Meters Co.

$60-Billion In Taxes

The fact that the electric utility industry has maintained price stability of the kwh is not happenstance, but the result of leadership, vision and courage to invest more for the best, Mr. Ebdon pointed out. He mentioned that the electric utility industry will have to do even better over the next 15 years as it will pay *60,000 megabucks* in tax dollars over this period to pay for all the advantages of our way of life.

Titus G. LeClair, manager of nuclear power applications for General Atomic Division, General Dynamics Corporation, reported that nuclear power plants scheduled for operation in 1963-4 are expected to produce electricity for about eight mills per kwh, which is close to the current power costs in some fuel-scarce areas of the U. S.

Mr. LeClair added that large-scale atomic plants, on the order of 300,000-kw capacity, are being designed and can be expected to bring costs of atomic power still lower. He cited some of the technological advances which are being made toward the achievement of competitive nuclear power, such as: Increasing the power density in the nuclear core, increasing the pressures and temperatures of the steam produced and lowering of fuel costs through (a) simplified cladding of the reactor fuel elements, and (b) greater burnup of the uranium fuel to provide longer fuel lifetime.

Mr. LeClair predicted that nuclear plants may account for 10 percent of the new power-generating capacity added in 1970 and perhaps 25 percent in 1980. This could mean 5-million kw of nuclear power capacity in 1970 and 45-million kw in 1980.

Supercritical Plant

Papers given on the design, operational procedures, problems encountered, etc. of the Avon No. 8 Unit on the Cleveland Electric Illuminating Company's System created extremely high interest. The 1100 F, 3500 psig unit with its CE-Sulzer boiler and Westinghouse Turbo-generator was reported as a success—after a few modifications.

345 KV On Wood Poles

T. W. Schroeder of Illinois Power Company revealed that construction costs of up to 10 percent can be saved with wood-pole construction over steel-tower construction at 345 kv in the territory served by his company. He also mentioned that his company's experience with maintenance on wood H-Frame lines has been almost negligible, but in contrast, steel towers have required painting every 7-8 years after they reach an age of 20-25 years.

Automation And Control

A standing-room-only crowd listened to very interesting presentations on automation of power plants, systems and monitoring, logging, and computing performance of an existing coal-and-oil fired station. Many of the problems and applications of computers were discussed by manufacturing and utility representatives. As expected, no one presented a "standard" automatic control system that would work in all cases; in fact, it was pointed out repeatedly that each situation has its own peculiarities and needs to be designed to fit a particular operating situation. Improved reliability, reduction in manpower and less human errors were given as some of the plusses of automation.

System Planning And Operation

Two papers were presented by representatives of manufacturers and two by utility representatives on system planning and operation. Automation has worked its way well into planning as well as operation according to those presenting papers.

Left to right, R. A. Budenholzer, American Power Conference Director, S. R. Knapp, President of EEI, Dr. A. A. Potter, Dean Emeritus of Engineering, Purdue University, and William H. Byrne, President ASME. Photo taken after Mr. Knapp's message on the utility manpower situation.

Nuclear Plant Costs

Dr. R. B. Richards, Manager of Engineering, Atomic Power Equipment, General Electric Company, stated that a standard 500-mw, dual-cycle boiling water reactor plant can be built at a cost of $175 per kw under favorable site conditions. He said that this large atomic plant would initially produce power at 6.56 mills/kwh but this would decrease to 6 mills with the third core loading.

Peaking Units

H. A. Carlson and W. D. Marsh of GE predicted that gas turbines may double in size before the end of this decade. Peaking gas turbines are presently available in unit sizes from 10-30 mw at an installed cost of $75-$100/kw. This can mean a savings of $35-$70 per kw over conventional base-load generation, according to GE.

B. B. Brownell's paper stressed the flexibility, mobility, quick start and reliability of General Motors' diesel-peaking units. Installed costs of diesel units have been reduced from $175/kw in 1954 to $100/kw in 1960. In 1961 the cost of installed diesel units is expected to be even lower, according to Mr. Brownell. He also emphasized that the reliability factor for these units has been as high as 99.15 percent.

Sea Water Conversion

Two excellent papers were given on sea water conversion. R. E. Whistler of Southern California Edison stated that pilot-plant production costs, including operating labor, steam, power, chemicals, maintenance and fixed charges have been calculated at $1.92 per 1000 gal. He predicted that a 10-million gal. per day plant of similar design would produce water at $1.00 per 1000 gal.

G. E. Sonderman of Singmaster & Breyer pointed out that sea water has been converted at costs as low as 40 cents per 1000 gal. Mr. Sonderman's paper will be presented as a feature article in ELECTRIC LIGHT AND POWER in the near future.

Southwest Electric Conferees Gain New Perspective On Economic Recovery

Participants in the Southwest Electric Conference included (L to R): Sherman R. Knapp, president, Connecticut Power Light Co. and president of EEI; J. W. McAfee, president, Union Electric Co.; George R. Perrine, chairman, Illinois Commerce Commission; and C. A. Tatum, Jr., president, Dallas Power & Light Co.

Strength of end-product demand throughout the initial quarters of this year, coupled with continued inventory liquidation, has brought an end to the recession which began last summer. This was the cheering news brought to the Southwest Electric Conference by Martin R. Gainsbrugh, chief economist, National Industrial Conference Board and professor of economics, New York University.

This conference was held on April 9-11 at the San Marcos Hotel in Chandler, Ariz.

Such sensitive measures as not only hours of work but also raw-material prices, housing starts, new incorporations and stock prices, the typical precursors of recovery, have been in ascending phase since the start of the year, Mr. Gainsbrugh reported. He said the conference board's latest survey of customer intentions reveals an unprecedented confidence among consumers about prospects for local job opportunities and family finances in the half year ahead.

Businessmen, too, has sensed the forthcoming improvement in their markets. This is clearly evident, Mr. Gainsbrugh pointed out, in the board's latest survey of capital appropriations of the thousand largest manufacturing corporations.

The decline in capital spending appropriations during the first nine months of 1960 was the mildest in the eight-year record of the board's survey, and also the shortest. The sharp upturn in manufacturer's appropriations posted in recent months suggests, Mr. Gainsbrugh said, that the capital goods industries will in turn be most favorably influenced as investment decisions are transformed into new orders.

Noting that by the end of this decade the total labor force will have risen to 87 million (from 73.5 million as of March 1961), Mr. Gainsbrugh observed that no other generation has been called upon to create as many jobs in one decade. This is the greatest single challenge of the 60's, he said.

In his opening remarks as conference chairman, J. W. McAfee, president, Union Electric Co., spoke of the new spirit of cooperation within the industry. Referring to the greater interest in pooling and interconnection, Mr. McAfee declared "We can do it with a competence no one else can match."

Sherman R. Knapp, president, Connecticut Power & Light Co., and president of EEI, also emphasized that the path of growth lies in pooling; that there is a lot more that must be done. "We have got to jump over corporate, geographical, and political boundaries," he warned.

Echoing Mr. McAfee's observation that the big problem now is "to keep our suppliers strong." Mr. Knapp remarked that "manufacturers' research is largely responsible for our progress." He also called attention to the fact that over 1500 research projects are completed or "in the works" by the utilities.

George R. Perrine, chairman of the Illinois Commerce Commission, told of the big procession of rate hearings before this commission—20 major rate cases in eight years. He recommended as an acceleration measure in all rate cases the filing of "canned" testimony — an advance record of what every witness is going to say. This was an innovation by his commission.

A fuel-adjustment clause is now in effect for all power companies in Illinois, Mr. Perrine reported. This applies to all customers, including small users, he said, and has eliminated costly and time-consuming hearings.

Mr. Perrine observed that public understanding of utility problems is one of the commission's biggest problems.

Power companies and the IBEW are natural allies in the free-enterprise system, declared Gordon M. Freeman, president of this union, in his conference address. He also stressed his feeling that what is good or bad for the utilities is good or bad for the workers and that management and labor must exercise a high degree of responsibility in dealing with each other.

Mr. Freeman suggested creation of a national council for the utility industry similar to that now serving the electrical contracting industry, which council is made up of six members of NECA and six members of IBEW. He emphasized that council decisions are made by people

Ralph J. Cordiner, president and board chairman, General Electric Co., who also addressed the Southwest Electric Conference.

directly concerned in the problems before the council.

Legal rights to make agreements with management have been denied the unions on government power projects, Mr. Freeman declared. He reported that 75 percent of all electric utilities recognize unions, and that for the power companies alone this figure is 92 percent. Union recognition by 1032 rural cooperatives is only 17 percent, Mr. Freeman said, and only three percent of the 1782 municipals recognize unions. Out of 63 public utility districts, 35 recognize unions, said Freeman.

Dr. Howard A. Rusk, associate editor, The New York Times, and chairman, Dept. of Rehabilitation and Physical Medicine, New York University, told the Southwest Electric Conference delegates of the self-help devices developed to aid the handicapped.

Ninety percent of all disabled persons can be taught to make their own living, it was asserted by Dr. Howard A. Rusk, associate editor of the New York Times, who also addressed the conference. He described some of the more than 3000 self-help devices developed in the last decade by the Institute of Physical Medicine and Rehabilitation, which he heads. The institute is a unit of the New York University Bellevue Medical Center.

Speaking primarily on "The Saga of a Kitchen," Dr. Rusk described the development of a kitchen which can be operated entirely from a wheel chair, or with only one hand.

"Out of the kitchen grew the functional home of easier living," Dr. Rusk explained, "which was designed specifically for physically disabled, the elderly and those with cardiac handicaps."

Expanded Research Needed, Knapp Tells SEE Conference

Utilities must expand their research activities and must plan to expand them further if they are to face up to the challenge of meeting tomorrow's power needs. This was the message of Sherman R. Knapp, EEI president, and president of Connecticut Light & Power Company, addressing some 360 delegates to the 28th Annual Conference of the Southeastern Electric Exchange held in Boca Raton, Florida, March 27-29.

Shareholder public utilities will have to organize, staff, and finance research in considerable depth and breadth, said Knapp, if manufacturers of our "hardware," whose research has made possible so much, are made subject to foreign competition and home-grown limitations.

The utility industry faces, for the first time in its history, a rising trend in power production costs, said C. H. Linder, General Electric Company vice president. Technological progress *as usual* is not now enough to offset inflation, he declared.

"Our future depends on the use we make of our resources, the choices and values which this use represents." These new realities call for renewed economic discipline—for new standards for measuring value, Linder asserted.

The investor-owned electric utility industry has been missing a good bet in not supporting economic efficiency in government water resource projects, according to Jack W. Busby, Pennsylvania Power & Light Company president. We have concentrated too much attention on ideology and too little on economic analysis in the field of water resources. We should bend our efforts to see that government multi-purpose projects proposed make good sense on the criteria of economic efficiency, he added.

Electric Growth

The biggest opportunity for growth that utilities face today and one that "we must develop if we wish to continue to grow" is the residential heating market, according to John H. K. Shannahan, American Electric Power Service Corp. The 850,000 present home heating customers demonstrate that the public is ready to be sold electric heating. We must approach this job aggressively, and go out and sell it, he emphasized.

Financing for Growth

The task of financing growth ahead is greater than any so far met in the post war years, said Ben S. Gilmer, Southern Bell Telephone and Telegraph Company president. Meeting this challenge successfully will require improved inducement for capital attraction. We must continue to compete in the open market for capital, he declared, but we must now compete as never before for the customer's dollar. In addition, he said, we must find ways to induce the regulatory authorities to permit our keeping profits from our competitive activities so as to

SEE President W. C. MacInnes, right, Tampa Electric Company president, poses between sessions of the SEE annual conference with speakers: (l. to r.) S. R. Knapp, EEI president; C. H. Linder, AIEE president; and J. K. Busby, Pennsylvania Power & Light Company president.

Planned maintenance can delay for many years the expense of placing new poles.

HOW TO KEEP STANDING POLES STANDING LONGER

Three keys to an effective preventive maintenance program

Because of the continually mounting expense of setting new poles and transferring fixtures, there is no longer any doubt of the value of planned pole maintenance. Experience of utilities pioneering such work proves that supplemental preservative treatments will extend pole life many years . . . stretching maintenance dollars and deferring capital expenditures.

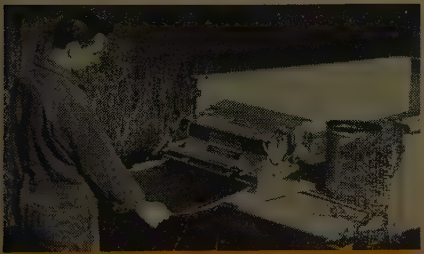
Success of such a program is dependent upon: 1) Regular and thorough inspections of standing poles. 2) Treatment as necessary with preservatives designed for this specific purpose. 3) Keeping accurate records of inspections and treatment.

The most widely used preservative products for pole maintenance are manufactured by Chapman Chemical Company. They contain pentachlorophenol, the superior wood preservative which gives proven results in preventing decay and insect attack.

With specific products for pole maintenance needs and broad experience in this field, Chapman can help you establish a complete program to insure best results at least expense.

USE THESE CHAPMAN PRODUCTS FOR SUCCESSFUL POLE MAINTENANCE

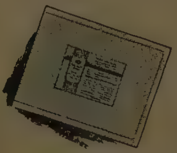
Pol-Nu® Preservative and Bandage-Maker



Pull out Pol-Nu bandage...wrap around pole.

Chapman Pol-Nu is a patented grease-type preservative containing a full 10% pentachlorophenol in solvent oils which meet AWPA specifications. It gives excellent penetration, is not water soluble. Pol-Nu is used for ground-line treatment and to prevent decay in checks and cracks above ground.

The Chapman Pol-Nu Bandage-Maker is a unique, portable device which prepares ground-line treatment bandages in the field. It insures a uniformly accurate Pol-Nu preservative application on every pole that is treated.



Pol-Nu Pak

Convenient ground-line treating bandage containing Pol-Nu. Factory-sealed envelope insures proper amount of preservative, is easy to apply. Handy for spot treating and "change-outs" as well as full-line treatment.

Pol-Kap and Applicator

The Pol-Kap is a permanent preservative topping for poles which seals out moisture and releases pentachlorophenol into wood to kill decay. Easily, safely applied with special applicator which locks on end of hot stick.

Penta Plus 40

Oil solution of pentachlorophenol for full-length pole and cross-arm spraying, and brush or soak treatments at retirement yards. Penta Plus 40 restores preservative protection economically.

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Leading manufacturer of wood preservatives

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Please send complete information on products for pole maintenance to:

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strengthen our enterprises for the public good.

Fuel costs for nuclear plants can be improved over the years, according to Roger J. Coe, Yankee Atomic Electric Company vice president, on the basis of a number of factors that are almost certain to develop: 1. Longer fuel life; 2. Lower U-235 prices; 3. Lower fabrication costs; 4. Higher thermal efficiency; and 5. Better conversion ratio. A combination of any two or three of these factors, he said, can result in quite attractive fuel costs for nuclear plants of the future.

Safety awards were presented to the Potomac Electric Power Co., New Orleans Public Service, Inc., Kingsport Utilities, Gulf States Utilities, and Arkansas Power & Light Co.

New officers elected were: President, O. J. Miller, executive vice president of Duke Power Co.; First Vice President, R. B. Wilson, president of Mississippi Power & Light Co.; Second Vice President, J. J. McDonough, president of Georgia Power Company; and Third Vice President, R. Roy Dunn, president of Potomac Electric Power Co.

World Lighting Forum Draws 1700 Conferees

The World Lighting Forum, a series of nine symposiums conducted by top lighting authorities, held in conjunction with the Third National Lighting Exposition last month, was attended by more than 1700 utility representatives, lighting equipment engineers, salesmen and others interested in lighting.

Keynoting the opening symposium, R. G. Slauer, Sylvania Electric and IES president, said that good lighting is an outstanding factor of economic growth. Highway and street lighting is just one of the key goals of development; it is the direct challenge of natural and artificial light. Light is still the great symbol of all the things that mean so much.

Comparing lighting in Europe with that in America, A. H. Feder, Lighting By Feder, stated that the thinking behind lighting design is similar, but there may be a time lapse before a particular trend is copied in one place or other. The average American lives in much more light in the daily situations than his European counterpart. The wide use of outdoor lighting abroad is due to more forward thinking on the part of government there, and not to lack of know-how here. America is ahead in the use of light itself as a material, while Europe excels in auxiliary lighting materials, he said.

In the opinion of Stacy Standley, Line Material, there are few things today that will give as much value for the dollar as you can in street lighting. The need for lighting on a national basis is critical and the potential is fabulous. Street lighting is only costly when it is improperly planned, he asserted.

E. B. Karns, Westinghouse, stressed that modern highway lighting is now, more than ever, the application of the "science of seeing." Seeing is a vital factor in nearly all aspects of traffic safety. Statistics show that only a few accidents are due to mechanical failures. Yet, provision for quick and certain seeing on our highways at night is practically non-existent in many states.

According to E. C. Powers, Griswold-Eshleman, crimes reported by five police patrol cars, after a new high level street lighting installation in Indianapolis, were considerably lower than those reported in a similar period before the new lighting: (1) 501 Vs 598. (2) 517 Vs 564. (3) 531 Vs 571. (4) 451 Vs 493. (5) 448 Vs 477.

Every lighting system on the drawing boards today is obsolete, according to E. A. Linsday of G-E's Nela Park. Even sunshine is obsolete where seeing is difficult, he said. C. L. Amick, Day-Brite, also speaking on the "Success of the New Recommended Higher Footcandle Levels for Office, Industrial and Institutional," stressed several basic principles:

1. High-brightness fixtures give gloomy appearance when installed in rooms with dark ceilings, walls and floors.
2. Stay away from monotonous treatment. Vary the environment to fit the space. High brightness and glitter are appropriate for certain stores, lobbies, etc., but watch out for comfort in work areas.
3. Guide the decorators in selecting room-surface reflectances.
4. Wall lighting can contribute much to a pleasant environment.
5. Occasional opaque baffles or panels will break up the monotony of luminous ceilings.
6. Dimming is practical for rapid-start fluorescent lamps and convenient wall-mounted controls are available to modify illumination levels in multi-purpose rooms.
7. Use pictures, wall treatments, draperies, furniture, etc., to create desired environment without sacrificing lighting comfort.

Linsday showed a number of slides of high level lighting installations which had produced exceptionally good results and proved without a doubt that these new intensities were not too high.

In 1961, three times as much light will be used in this country as was used as recently as 1948, declared A. K. Gaetjens, General Electric, and five times as much fluorescent light will be used as that used in 1948. There is a trend toward the use of higher wattage, longer lived and more efficient lamps, he said.

A recent survey showed that 84 percent of the people questioned were satisfied with their present lighting, most of it grossly inadequate, said Elizabeth Meehan, Philadelphia Electric Co. Utilities are the only ones who can reach large groups on a personal level and, if they do not bother to do this, they are missing their share of load and dollars that lighting offers.

The lighting design engineer's attention to illumination levels and glare elimination was more or less adequate for the creation of comfortable visual environments while illumination levels were relatively low, but the advent of high level illumination has introduced new problems, or at least placed much greater emphasis on what were previously only minor problems, stated Carl W. Evans, Editor of LIGHTING. The result is that comfortable visual environments at these higher levels can only be created by giving adequate attention to more control over lighting direction and the so-called psychological factor in design.

DON'T OVERLOOK THE MECHANICAL CHARACTERISTICS WHEN EVALUATING YOUR POWER FUSES

Thermal and electrical characteristics rightfully deserve first consideration in evaluating power fuses, because the fuse must carry rated continuous current and interrupt rated short circuit currents to perform its primary function.

But from an operating and maintenance standpoint, the fuse's mechanical characteristics should not be overlooked. Here are nine of the most important features to consider:

1. **OPERATING RING** Can the fuse holder be easily disengaged from the latch? It is important that the operator have complete control over the fuse holder during the opening procedure. Southern States BPA and HPA fuses have full-circle operating rings to assure complete control.

2. **FUSE HOLDER REMOVAL** Can removal or replacement of the fuse holder be accomplished easily and simply? Special, cumbersome, rigs are objectionable to operating personnel. Southern States fuse holders are handled with a hookstick.

3. **SLEET HOOD** Are the top contacts fully protected from freezing rain, snow, or other foreign matter? Note the extra large hood on Southern States fuses.

4. **POSITIVE HOLDER GUIDE** Will the fuse holder make proper engagement with the top contact, even when closing is made from an oblique angle? Southern States fuses are equipped with generous guide arms on the sleet hood to position the holder properly, regardless of side thrust.

5. **POSITIVE IDENTIFICATION** After operation, does the position of the fuse clearly indicate that an operation has taken place? Southern States fuse holders swing to a fully open position and can be easily spotted from a distance.

6. **SHOCK ABSORPTION** After operation, does the fuse provide a sure means for bringing the fuse holder to a cushioned stop? Damage to the fuse mounting is prevented on Southern States fuses by properly designed snubbers.

7. **LINK PROTECTION** When the fuse holder is slammed closed, is there some means to prevent overstressing the link? To avoid the possibility of rupturing a link, mechanical locks on the BPA and HPA fuses absorb force transmitted through the bottom hinge assembly.

8. **RESTORING SERVICE** Is the fuse easily and economically restored to service after operating? Fuses that require elaborate replacement components to keep them in service are not only costly, but burdensome to both supply and operating personnel. A simple, inexpensive fuse kit is all that's needed to restore service with Southern States power fuses.

9. **SELF-LOCKING HINGE** When the fuse operates, are the fuse holder and fuse mounting locked together? For safety reasons and to avoid possible damage to nearby equipment, Southern States fuses are equipped with self-locking hinges.

Before you buy your next power fuses make certain they measure up in every respect. Southern States BPA and HPA Power Fuses will.

For complete details, consult your Southern States representative, or write direct to us.

SOUTHERN STATES

HAMPTON, GEORGIA

IN CANADA: DOMINION CUTOUT CO., LTD., TORONTO

MANUFACTURERS-PRODUCTS

Prices Up Or Down?

GE announced that effective March 29th lamp prices will be raised and lowered. Prices on high-volume fluorescents went up, some special low-volume types went down and other specials up. Net total effect is about one percent increase in list prices.

GE increased prices on fuse links from 1.8-5 percent and cutouts from 5-5.5 percent effective April 17th.

Line Material increased published prices of capacitor units and equipment on March 27th. The price of 50-kvar units is now $117.00.

GE reduced feeder-voltage step regulator prices by 15 percent and apparatus-bushing prices from 3-9 percent on January 30th.

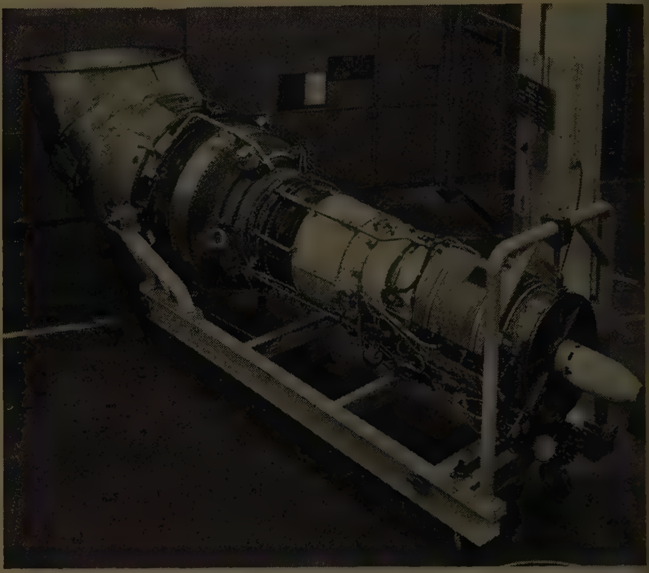
Dry-type instrument transformer discounts were increased by **GE** on March 13th and discounts on liquid-filled instrument transformers were reduced by one percent. **A-C** raised large power-transformer "net" prices effective March 15th and changed multipliers on prices for small power transformers (501-10,000 kva) to effect an increase in net prices effective April 17th.

On March 5th, **GE** announced that the price of its recently introduced gas-turbine package power plant was reduced from $100.00 per kw to $85.00 per kw. The rest of **GE's** mechanical-drive and power-generation gas turbines were reduced about 8 percent.

Wrought Fittings Are Soldered in Less Than ¾ Time Required for Cast Fittings

Chase Brass & Copper Co. demonstrated by timed tests that their new wrought drainage fittings could be soldered in 46 percent less time than cast fittings. It took 45 seconds to solder the Chase fittings and 66 seconds for the cast fittings.

Jet Engine Combined With Power Turbine



General Electric's Model 240 turboshaft engine—the first large aircraft jet engine to be converted for sea-going application—is shown here prior to entering a test cell. A power turbine, which works on the order of a windmill, has been added to the J79 turbojet to convert the engine's high-velocity jet exhaust into shaft horsepower. Various configurations of the engine and exhaust system are also applicable for use in mobile electric power systems and as prime movers for peaking power generators.

Bare-Hand Maintenance Demo On Tour

The Holan Corp., Cleveland, Ohio, have announced that they will send a two-man team on a tour demonstrating high-voltage, live-line maintenance. Of course, the "Holan Elbow" (insulated aerial lift) will be used in the demonstration.

The lineman works in a fiberglass bucket lined with metal mesh that is connected to the energized line he is servicing by metal clamps. Since he is at the same potential as the conductor (although physically unaware of it), no current flows through him.

The new system permits line repairs without interruption of service, eliminates cumbersome tools and equipment and offers greater safety in many cases than present practice.

For a further explanation of bare-hand, live-line maintenance please refer to the December 15, 1960, issue of **ELECTRIC LIGHT & POWER**—P. 62.

System Load Control Contract Awarded

Columbus and Southern Ohio Edison Co. has awarded a contract for a Bailey 720 Economic Load Control System that will automatically control power generation. The system contract was awarded to the Bailey Meter Co. and is to be installed at three of the utility's plants.

This system will automatically control frequency and/or tie-line load as well as distribution of load on incremental rate basis between eight generating units at the Conesville, Picway and Poston Stations. The master control and System's dispatcher's console will be located in the dispatcher's office in Columbus. Frequency-type telemetering over telephone lines and power-line carrier will connect it to the individual control equipment at the stations.

TVA Boiler Contract To Combustion Engineering

Combustion Engineering, Inc. has submitted the apparent low base bid to TVA for the construction of either one or two of the largest steam boilers ever built. The basic boiler will be capable of producing 6.1-million lbs of steam per hour at a pressure of 2450 psi and a temperature of 1053F.

Under requirements of the contract, the first of the steam generators must be ready to operate at "Plant X" by September 1, 1964, followed by completion of the second unit a year later.

While the site of "Plant X" has not yet been chosen, it is believed that it will be close to the coal fields in southern Kentucky or northeastern Tennessee.

More Price Reductions

ALCOA reduces price of aluminum rigid conduit 5 percent shortly after **Youngstown Sheet & Tube** promises 5-percent discount on its galvanized steel conduit shipments through 6/30.

LIGHTWEIGHT
All Aluminum-Magnesium Alloy
Conductor Stringing Blocks

S&R exclusive safety locking head pin. Type GNA Permanently Bonded Full NEOPRENE lining optional. All S&R Blocks have anti-friction ball bearings.

74-A SERIES
Conductor guard comes over sheave rim to guard against pulling line or conductor from fouling between frame and sheave. Particularly valuable for tension stringing.

73-A SERIES
Wide throat for passing compression sleeves. Designed for reconductoring—particularly valuable when the old conductor is used for a pulling line.

New '61 Catalog Sent on Request

Sherman & Reilly, Inc.
ENGINEERS AND MANUFACTURERS
First and Broad Streets
Chattanooga 2, Tennessee
Telephone AMherst 7-1273

Exclusive Canadian Representative:
A. B. Chance Company of Canada Ltd.
Box 10 Toronto 13.

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Please send the new S&R complete catalog of Conductor Stringing Equipment.
NAME
COMPANY
ADDRESS

where you find... TRANSMISSION DISTRIBUTION *you'll find S&R...*

To insure fail-proof multiple lighting control

There's nothing untried, no lack of field proof when you install Precision photocontrols. Major utilities—with hundreds of thousands of installations—have proved Precision's reliability on their lines for more than 4 years.

The reasons? Precision is *simply* the best-engineered, best-built tubeless photocontrol at any price. Because it pioneered tubeless lighting control, it gives you more proven performance on all installations — 500-watt farmyard lighting to 3000-watt white-ways.

Advanced engineering Precision embodies 2 time-proven components — a wide-area cadmium sulfide cell directly regulating a long-life integrating relay. No capacitors, rectifiers, sensing leads or tubes to "fail out" in Precision. Other control circuits need up to 18 such fragile components.

On-the-lines dependability Inconspicuous transparent housing gives *total area exposure* to light sensing cell. No shading, no shielding in Precision to overload cells or intrude upon "human eye" responsiveness. Calibrations are made directly on the switch for light levels 0.5 to 10 ft. candles. Housing admits light freely but is impervious to dirt, insects, moisture. Precision uses a 1-watt cell for long life. Its conservative rating never is exceeded in operation.

System-wide versatility Precision controls, guaranteed for 2 years, can be used interchangeably on every pole. Model D-2-275 conforms precisely with EEI-NEMA standards for locking-type controls. Its full-visibility housing, with molded index marks, simplifies North orientation for system-wide uniformity and makes it the easiest of all controls to "sight" wherever local light levels demand special consideration. Model D-2-375, with 3¾″ ID, puts modern control on older poles. Model D-5 fits standard watt-hour meter base and 22 adaptors and mountings make *one* control — Precision — the only control you need to stock for your entire multiple system.

Technical data on Precision are summarized below for your quick reference guidance in extending your automated multiple lighting systems with insured dependability. Precision welcomes comparative appraisal — in your labs and on your lines — with the performance of any other device for lighting control at any price.

Model	Supply voltage*	Type of switch	Load rating in volt/amps	Means of attachment
D-2-275	105/130	SPST	1800	Locking-type
D-2-375	105/130	SPST	1800	Locking-type
D-4-275	210/250	SPST	1500	Locking-type
D-4-375	210/250	SPST	1500	Locking-type
D-5	105/130	SPST	3000	Meter base
D-6	210/250	SPST	3000	Meter base
D-7	105/130	SPST	3000	Meter base

All Precision controls have Normally Closed contacts at night. Controls with contacts Normally Closed during the day will be furnished on specification. D-2-275 and D-4-275, 2¾″ I.D. D-2-375 and D-4-375, 3¾″ I.D.

*25/100 cycles, AC

Operating data on locking-type models

Inrush current rating: 120 amps at 120V; 60 amps at 240V
Time delay: Minimum 15 seconds
Temperature range: —40°F to +170°F (—40°C to +77°C)
Power consumption: Less than 1.4 watts average
Operating levels: 0.5 to 10 ft. candles, or higher as specified
Standard turn ON: 1.5 ft. candles
turn OFF: 0.5 to 1.5 ft. candles higher than turn ON
Lightning arrestor: Gap type, with 25,000 amp surge current capacity; 2000V impulse spark over.

Field service, on any aspect of Precision-controlled lighting, is immediately available from Precision engineering representatives in more than 50 U.S. and Canadian cities.

Write or wire for cost-saving quotations:

PRECISION MULTIPLE CONTROLS, INC. • Ridgewood, New Jersey

The difference between night and day

pecify Precision Model D-2-275, pace-setter
among all
EEI-NEMA
standard
photocontrols

Model D-2-275 is shown approximately 2½ times actual size

Searching for Meter Sockets?

look to . . .

SUPERIOR SWITCHBOARD & DEVICES CO.

CANTON 1, OHIO

A Subsidiary of

The Union Metal Manufacturing Co.

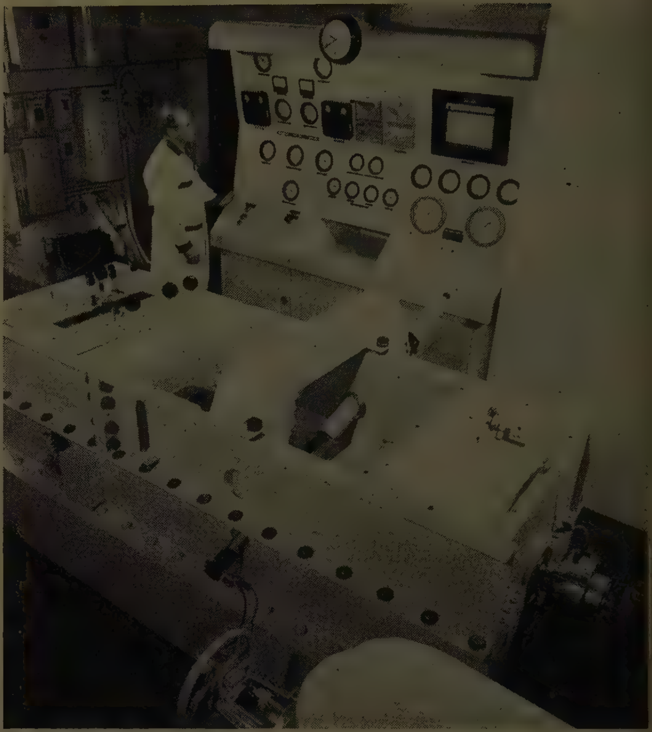
Socket Trough with Breakers

Drawn Ringless Socket

Write for a free Catalog outlining types and sizes of meter socket equipment, test switches, test blocks, reactiformers and enclosures.

SUPPLY FACILITIES

A-C Installs New Thrust-Bearing Test Facility



Allis-Chalmers adds a fully-instrumented test stand for continuous performance studies of thrust bearings for steam turbine-generator units. Capable of handling full-size thrust bearings, the new facility can be made to reproduce actual operating conditions of load, speed, lubricant temperature and oil flow. Bearings can be tested to destruction if desired.

Minneapolis-Honeywell has announced plans to open a new plant at Lowell, Mass., to manufacture components for its Honeywell 400 and 800 EDP systems. According to Walter W. Finke, president of the division, a "growing backlog of orders for both systems necessitates this new expansion of our productive capacity."

The small steam and gas turbine department has been formed by the merger of **Westinghouse Electric Corp.**'s small steam turbine department and the industrial gas turbine department. The new department will be under the responsibility of R. C. Twombly.

Hatfield Wire and Cable division of Continental Copper and Steel Industries, Inc., has announced that its Linden, N. J., rubber insulating plant is now in commercial production of high voltage multi-conductor power cables, control cables, and a wide range of other cable types not previously manufactured by the company.

General Electric has announced three expansion programs. The first, is for establishment of a new **Advanced Computer Development and Research Laboratory** and is scheduled for completion in December, 1961. It will be constructed in Sunnyvale, Calif. The second expansion program is a $1-million enlargement of its **Communications Products department** at Lynchburg, Va. The expansion will add 100,000 sq ft to factory, laboratory office and service areas. The third expansion is the recent purchase of a three-year old modern building on the outskirts of Cincinnati to house the **Distribution Assemblies department**, presently located at Norwood, Ohio. The new plant, together with new and modern production facilities to be installed represents an investment of more than $3.5-million. Transfer of equipment and installation of modern production devices are due to be completed in the late summer of this year.

Keeping Pace with Progress —

Haley's

uses the most modern plants to produce

— *Pentachlorophenol Treated* —

WESTERN RED CEDAR POLES

and

DOUGLAS FIR CROSSARMS

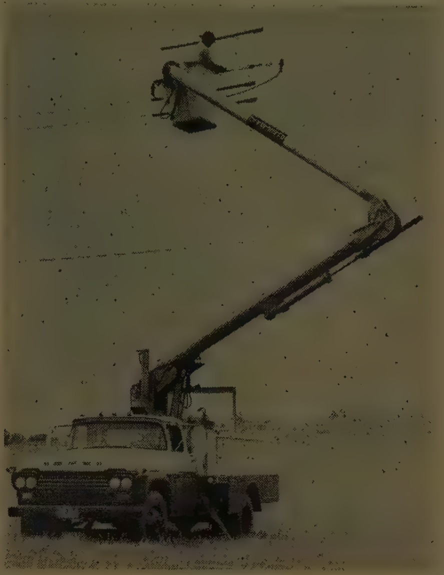
Our modern treating and fabricating equipment, storage yards and shipping service means we can serve you better, faster than ever before.

Plants at
Bellingham, Washington
Minneapolis, Minnesota
and
Findlay, Ohio

R. G. HALEY & CO., INC.
Spitzer Bldg., Toledo 4, Ohio

U. S. Air Conditioning Acquires Skyworker

Manufacturing, sales and servicing of Skyworker, the well-known hydraulic aerial lift, has been taken over by the Hughes-Keenan Division of U. S. Air Conditioning Corp. at their Delaware, Ohio plant. This acquisition includes the complete skyworker line.



This Skyworker, Model 1035 B, is being used in a mid-span splicing operation.

Sales Briefs

Allis-Chalmers has appointed three new motor-generator distributors. They are **Commercial Electric Motors, Inc.**, 113 South Alice, Monahams, Texas; **Georgia-Tennessee Supply Co.**, 425 Green St., S. E., Gainesville, Georgia, and **Upchurch Electrical Supply Co.**, 612 W. Center St., Fayetteville, Arkansas.

G&W Electric Specialty Company sales representation in Illinois-Indiana area was assigned to the newly created agency, **Boyle & Van Meter Co., Inc.**, 9500 Ogden Ave., Brookfield, Illinois, as of March 1st.

Eicher and Co., Seattle, Wash., has been named engineering field representative for part of Idaho and all of Washington and Oregon for **Associated Research, Inc.**, manufacturers of high voltage test equipment. At the same time, **J. E. Redmond Supply Co.** was designated engineering field representative for the state of Arizona.

don't hang by your thumbs

but it will pay you to wait for the big news in distribution transformers

LL-65

coming soon from Westinghouse

J-70963-1

Why Use Potheads?

Because—— Potheads are the best way yet devised to terminate cables.

Why?—— Only a pothead provides a grounded, hermetically-sealed metallic housing over the bare cable for effective protection against weather and corrosive atmospheres. Extra insulation between conductors and to ground is built up in potheads with dielectric materials of high strength, amply protected by the housing against deterioration. Mechanical seal of cable to pothead is excellent, making it easy to secure cable termination solidly.

True—— There are other methods of terminating a cable. These are good and may be entirely adequate for certain conditions. But only a pothead has the extra characteristics that pay off in best service over the years.

What Extras?—— Potheads are best because they have extra features to enhance life, reliability, and continuity of service, while requiring minimum maintenance. They have extra stamina, too, for the difficult situations and for emergencies such as switching and lightning surges, corrosive salt and industrial fumes, and unusual cable-support problems.

G&W—— Standardized potheads covering 80 percent of uses are available for fast off-the-shelf delivery. Other potheads are available for special uses or can be designed for even the most unusual cases. Other types of termination are also available. Write G&W about your problem or contact your nearest sales representative. Data is available on both standard and special-use potheads upon request.

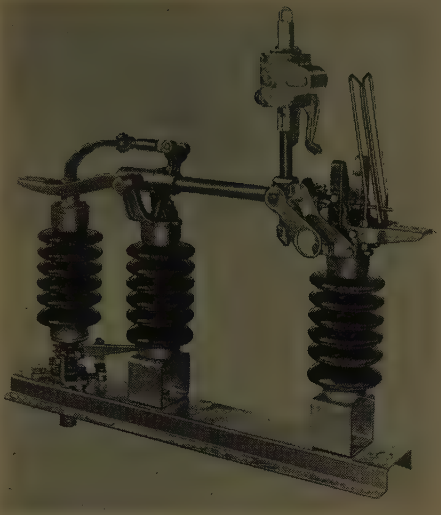
G&W

G&W ELECTRIC SPECIALTY COMPANY
3504 WEST 127TH STREET • BLUE ISLAND, ILLINOIS
Canadian Mfr. • Powerlite Devices, Ltd. • Toronto, Montreal & Vancouver

superior quality standards—inspired specialized design

Distribution Load-Break Switch Has Power Class Features

Distribution load-break switch, the ARI-60 by **James R. Kearney Corp.** gives power class operating and load breaking capabilities to distribution equipment. Rated 600 amps at 7.5, 15 and 23 kv, it features rotating blade, high pressure contacts, and an enclosed hinge for good corrosion and ice resistance. Blade rotates on its own axis to relieve contact and then is elevated to open position. Excellent mechanical advantage is provided by the simple three-link blade mechanism. Front contact utilizes magnetic effect of increased current to build up contact pressure under short circuit. Normal 125-lb contact pressure is provided by stainless steel springs insulated from the current path. Contacts are silver to silver. Operating mechanism incorporates a unique inter-phase clevis design that simplifies and greatly reduces adjustment and installation time. The Arc-KO Interrupter Unit's spring, trip latch and plunger type contact interrupts current quickly regardless of operator speed.



Circle item #1 on reply card

"Twin" Series Meter Sockets

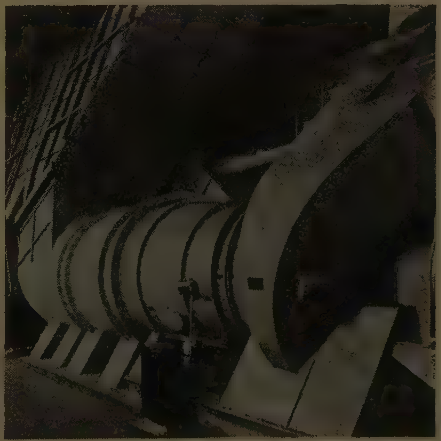
"Twin" Series (ringless and ring style) meter sockets by **Milbank Mfg. Co.** are available in either style in 9 in., 10½ in. or 12 in. heights. Sockets are extra wide. Features include slotted type terminal jaw for cooler operating temperatures, meter supports that fold out of the way during installation, meter aligning guides to properly locate meter in vertical position, and 4/0 angle tin plated aluminum extruded terminals.

Circle item #2 on reply card

Axial Flow Fan

Variable axial flow fans by **Novenco, Inc.** feature continuous regulation from zero to maximum output, at constant speeds, with minimum power consumption. Interchangeable snap-out blades with variety of fin structures. Fifty percent space saving. Controlled during operation by blade angle variation at constant speed. Ball and roller bearings used throughout. High efficiency.

Circle item #3 on reply card



don't hold your breath

but wait a little while
for the biggest news in
distribution transformers
in 50 years . . .

LL-65

coming soon from
Westinghouse

J-70963 2

KULJIAN *POWER ENGINEERING* MAKES THE DIFFERENCE...

because Kuljian offers a staff of internationally recognized experts in every phase of every type of power plant facility. Thermal, hydroelectric, nuclear and internal combustion . . . a Kuljian project incorporates proven concepts in modern power development.

Each project receives the close personal supervision of a key executive from inspection to completion.

More than 30 years of achievement attest to the success of Kuljian's approach to power plant design, engineering and construction supervision. Write for descriptive brochure.

ADDITIONAL KULJIAN SERVICES

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DESIGN • ENGINEERING • PROCUREMENT • CONSTRUCTION • REPORTS

Wedge Clamp

"Snap-in" type wedge clamp for service entrance connections is now being manufactured by A. B. Chance Co. The clamp is quickly installed, as a squeeze securely snaps the stainless steel bail to the wedge after the bail has been looped through a wire-holder. The conductor tension keeps the connection from uncoupling during service use. "Snap-in" wedge clamps are in two sizes—for conductor ranges of #6 to #2 ACSR and #4 to 1/0 ACSR.

Circle item #4 on reply card

Low Ground Pressure Trencher

The Davis T-66 Trencher-Backfiller by **Davis Mfg. Inc.** creates only 3.6 lbs of ground pressure per sq. in. so that it can operate in soft or wet terrain. It has large, self-cleaning track shoes that don't tear out sod when working in landscaped yards. It weighs 1400 lbs and has its own backfill blade so that the operator can complete the job. Digs 4 in. wide to 66 in. deep and 12 in. wide and 66 in. deep.

Circle item #5 on reply card

FOR INSPECTION
MAINTENANCE
AND SAFETY. . .

ALL-ANGLE

BALL JOINT
INSPECTION
MIRROR

brings work into full view

- **INSULATED GRIP** of vinyl plastic for protection against electrical hazards.
- **HEAVILY CHROME-PLATED** for long, rust-free life.
- **TELESCOPING HANDLE** on most models. Convenient, easily adjustable.
- **MANY MIRROR SIZES** electrolytically plated, copper-backed

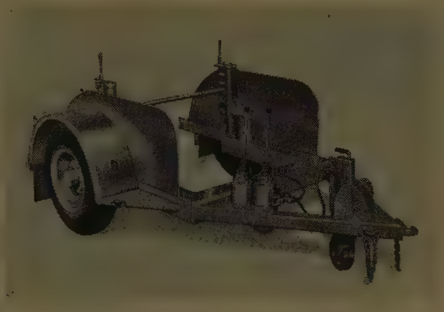
More details? Contact: ELP 5-3

ULLMAN Devices Corp.
Ridgefield, Conn.

Cable Reel Trailer

Hydraulic cable reel trailer, the Series RM Reel-Master by McCabe-Powers Body Co., allows one man to easily load and attach it to the towing vehicle without the help of a crane or winch. Two hand-operated pumps with independent hydraulic cylinders permit him to effortlessly elevate and level the reel to payout or travel position. A diverter valve permits operation of the landing wheel cylinder with the same pumps.

Circle item #6 on reply card



Portable Insulation Tester

Portable hand-crank d-c insulation tester by Multi-Amp Div., is simple in operation, accurate in reading, and light in weight. The unit (Type M), comes in four rated voltages and five ranges of resistance: 1000v/2000 megohms; 500v/1000 megohms; 500v/100 megohms; 250v/50 megohms and 100v/20 megohms. Weighs five lb and has response of 0.5 second.

Circle item #7 on reply card

don't jump

at the first chance when you buy distribution transformers . . . wait until you've heard about the really new

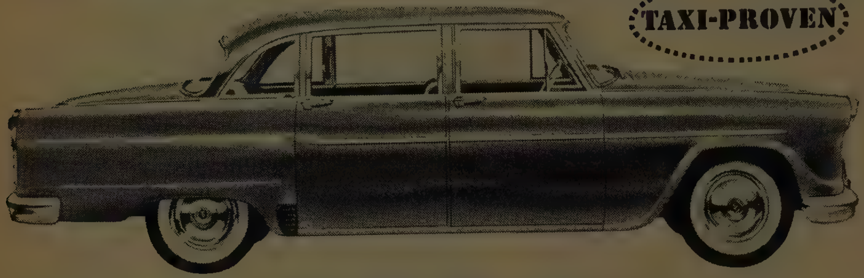
LL-65

coming soon from Westinghouse

J-70963-3

Who says they don't build 'em like they used to any more?

TAXI-PROVEN



CHECKER does!

And from the ground up. It's actually *hard* to wear out a Checker fleet car. After 150,000 miles . . . even at 200,000 miles of payload operation, a Checker is still going strong. Gas usage is gratifyingly low, maintenance costs are minimum and repair bills are few and far between. At Checker, we still build 'em like we used to . . . only better.

Shouldn't you check into CHECKER? Write DEPT. 44

CHECKER MOTORS CORPORATION
KALAMAZOO, MICHIGAN

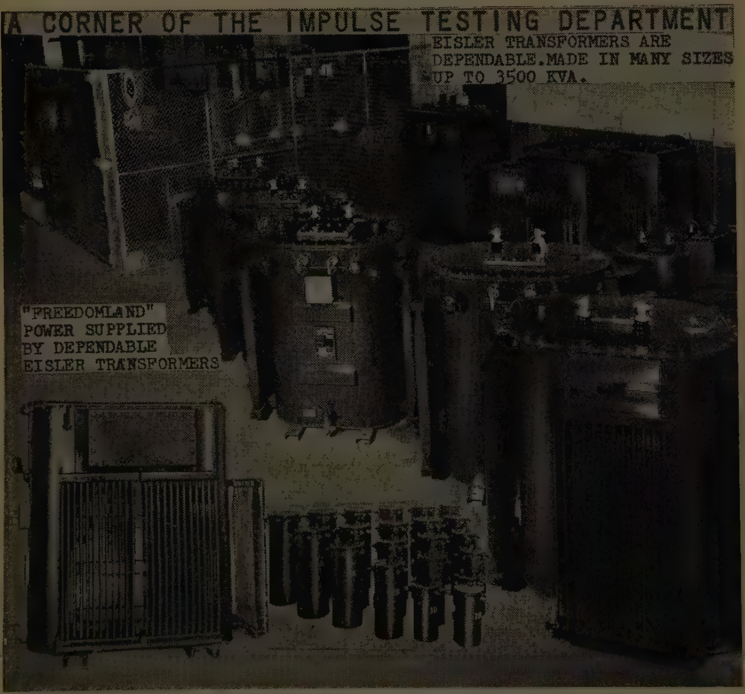
EISLER TRANSFORMERS

IMPULSE TESTED

Eisler transformers are dependable. Made in sizes up to 3500 KVA. "Freedomland" power supplied by Eisler transformers. Eisler has facilities and capability of producing and testing the highest rated units.

OIL FILLED

STANDARD & SPECIAL


A CORNER OF THE IMPULSE TESTING DEPARTMENT
EISLER TRANSFORMERS ARE DEPENDABLE.MADE IN MANY SIZES UP TO 3500 KVA.
"FREEDOMLAND" POWER SUPPLIED BY DEPENDABLE EISLER TRANSFORMERS

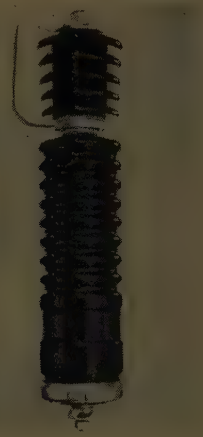
ASKERAL & DRY TYPE

EISLER TRANSFORMER COMPANY, INC., 20 NORTH SALEM ST., DOVER, N. J.

Valve Arrester

Distribution valve lightning arrester line, the Kearney "Unigap," in 3, 6, 9, 10, 12, 15, and 18 kv ratings by James R. Kearney Corp. features a new type of "Unitized" gap construction in which the functions of both a spark gap and separate coil have been combined in a single, rigid, precision assembly. Rapid magnetic arc movement and power follow current interruption are accomplished without an auxiliary coil of any kind.

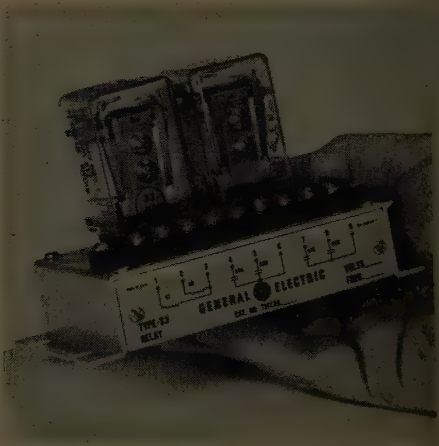
Circle item #8 on reply card



Metering Relay

Auxiliary relay for multi-circuit demand metering applications, the S-3 by General Electric Co., provides isolation for billing and controlling demand meters, and isolation of a contact device from pilot wires to a remote demand meter. Its main application is where more than one meter is connected to a D-30 contact device as in load survey applications, demand limiting or load monitoring.

Circle item #9 on reply card



MEN OF POWER

J. Theodore Wolfe, left, former president of Baltimore Gas and Electric Company, has been elected chairman of the board of directors and will serve as the company's chief executive officer. He succeeds **Charles P. Crane** who will continue as a director and chairman of the executive committee but devote more time to civic matters and other interests. In the same board action, **Austin E. Penn,** right, executive vice president, was named president.

Wolfe Penn

* * *

Hans E. Nissel, veteran public utility consultant, has been made a vice president of Middle West Service Company. For the past ten years he has been an independent consultant on matters relating to operation, regulation, and engineering economics, and has presented expert testimony before federal and state commissions.

* * *

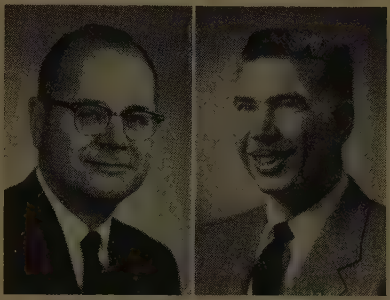
Frank F. Martin, former senior economist with the Edison Electric Institute, has joined The Kuljian Corporation as manager of sales, investor-owned utilities. In his previous post, he was engaged in financial and market analysis, forecasting and planning for investor-owned utilities.

* * *

Robert E. Walker, manager of systems and procedures for the Cleveland Electric Illuminating Company, has been elected vice president—general services. In his new post he will head up personnel, purchasing, office building services, and systems and procedures.

* * *

Cyrus G. Wright, right, former president of Otter Tail Power Company, has been elected chairman of the board. He succeeds his brother **Thomas C. Wright** who has retired from active management but remains as a director. **Albert V. Hartl,** left, executive vice president, was made president at the same meeting, marking the first time since the company was founded that a member of the Wright family has not been president.


Hartl Wright

* * *

Roy M. Casper, vice president of Allis-Chalmers Manufacturing

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you haven't heard the best news in distribution transformers until you get the whole story about the

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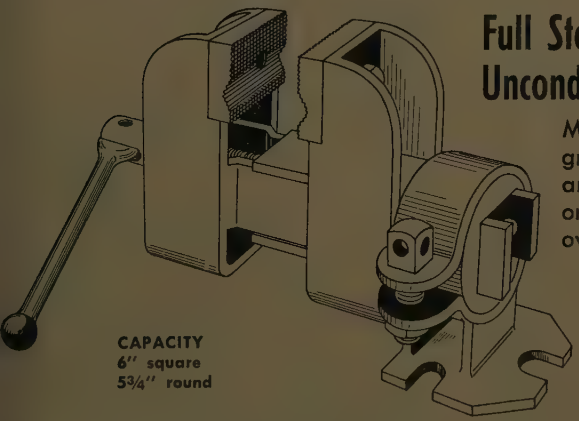

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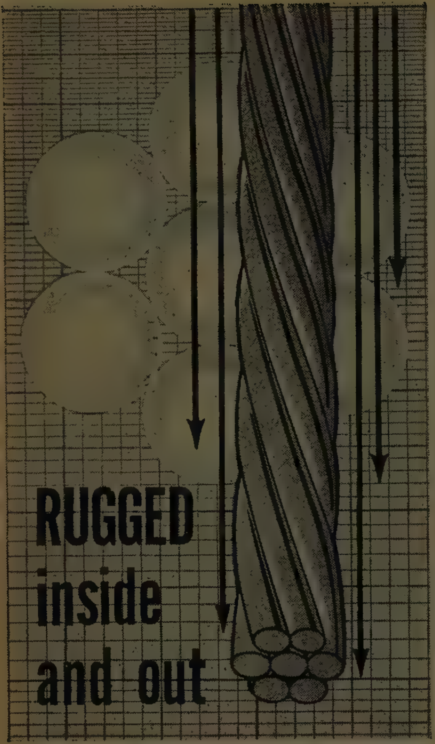

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INDIANA
Steel & Wire Co., Inc.
Muncie, Indiana

Company and general manager of the Atomic Energy Division, has been appointed general manager of the Power Equipment Division. He had previously served successively as manager of the electrical and power departments. He succeeds **J. W. McMullen** who retired May 1 after 45 years of service with the company. **Harold Etherington** is the new manager of the Atomic Energy Division.

* * *

Harold D. Beck, Jr., former manager of business planning at General Electric Company's Pittsfield, Mass., plant, has been appointed manager of the company's distribution transformer plant in San Francisco. He has held a number of managerial positions in manufacturing, engineering, marketing and personnel.

* * *

Warren W. Johnston, general sales manager of the Systems Division of Panellit, Inc., has been appointed vice president—operations for Panellit Service Corporation, an Information Systems, Inc., subsidiary. He will be responsible for integrating system design, instrumentation engineering, installation and maintenance functions into long range plans for expanding products and services.

* * *

Edgar H. Dunn, Jr., assistant general counsel of the Florida Power Corporation, has been elected vice president and assistant general counsel.

* * *

Bradford J. Stimpson, assistant marketing manager—power circuit breakers and power switching equipment for Federal Pacific Electric Co., has been named marketing manager for the same product lines.

* * *

R. F. Quinn, manager of Intermediate Distribution Sales for General Electric Company, has been appointed manager of a re-aligned Agency and Distributor Sales Development Operation which will develop and direct activities of some 1000 distributing houses representing 34 G-E product departments. Assisting him will be **J. F. Smith,** Utility Sales and Distribution Planning; **R. C. Hanna,** Distributor Products Sales Development; **Herbert Eaton,** Motor and Control Sales Development; and **J. F. Hurley,** Sales Promotion and Training. Headquarters will be at Schenectady.

* * *

Carlisle P. Myers, general counsel and corporate secretary of Westinghouse Electric Corporation, has been elected a vice president. In this new capacity, he will continue to direct the corporation's legal department, including the new antitrust division, and to serve as corporate secretary.

* * *

Hollingsworth

Thomas Hollingsworth, general sales manager of Hubbard and Company, has been elected vice president in charge of sales. Earlier in his career he had served in various sales management capacities in the apparatus division of Westinghouse Electric Corporation, later becoming manager of product planning before joining Hubbard.

* * *

Gordon F. Law, Roland O. Farrar, and **Thomas B. Groff** have been appointed power apparatus managers for I-T-E Circuit Breaker Company in Knoxville, Boston, and Detroit, respectively. Under a new marketing structure they will serve power apparatus customers exclusively.

* * *

T. A. Bedford, vice president in charge of engineering and construction project development for Kaiser Engineers, has been elected president and director of Henry J. Kaiser (Canada) Ltd.

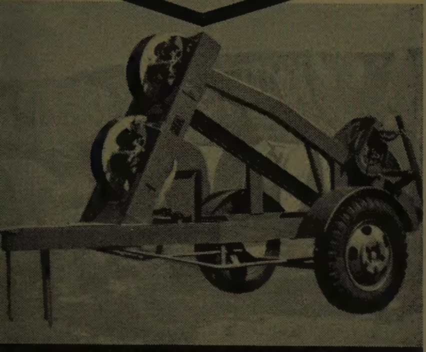
* * *

C. W. Mills, manager of electric utility sales department for Westinghouse, has been appointed manager of market development in the apparatus sales organization. **J. G. Aldworth** will take over Mr. Mill's former responsibilities.

* * *

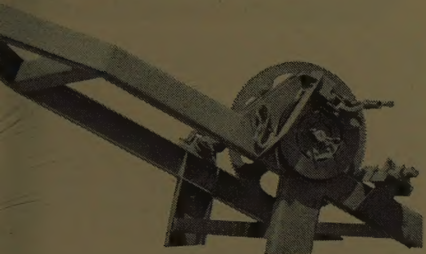
E. C. Hyry, formerly with Wood Treating Chemicals Co., has been named vice president of Pole Treat

Now—Convert your own Reel Dolly to a Bullwheel Tensioner
WITH A
PENGO
5000-U Assembly

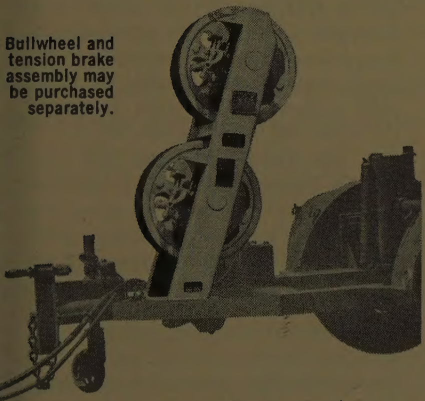


5000-U assembly installed by City of Medicine Hat, Alberta, Canada

Here's an easy way to build up a modern bullwheel tensioner at low cost—simply install a PENGO 5000-U Bullwheel Assembly to your old trailer or reel dolly. You'll have a tensioner with Neoprene-lined 26" bullwheels, capable of handling practically any distribution line stringing job at tensions to 2,000 lbs. at up to 4 mph.



Support arms, reel spindle with reel brake, and hand rewind assembly. 2⅝" spindle will handle reels to 75" diameter, 44" width unless reduced to fit your trailer.



Bullwheel and tension brake assembly may be purchased separately.

We invite you to write or wire for literature, prices—please address Dept. 28

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ing Co., an Asplundh subsidiary.

* * *

S. E. Biggs, former manager of the White Motor Company's truck and cab division, is now vice president, manufacturing, for Highway Trailer Industries.

Men of Power Briefs

Everett M. Kruger, formerly office systems analyst and manager for the RCA Electronic Data Processing division, has been appointed manager of Systems and Procedures for the division. **Douglas D. Milne** has been assigned responsibility for product planning and promotion in the Corporation's Microwave department.

T. R. Gale is the new manager of Utility Communications Sales for Graybar Electric Company, Inc., and will coordinate systems engineering and sales of complete microwave communications "packages."

Norman Sacks has been named product development manager for the engineering department of Burndy's Utility-Industrial division.

Frank Chambers is the new assistant manager of parts supply for the Electro-Motive Division of General Motors.

Charles Billings is the new manager of generation, transmission, and auxiliaries district sales in the Cleveland area for G-E's electric utility sales operations.

Dr. W. Howard Arnold, formerly with the Westinghouse Atomic Power Division, has joined the staff of Nuclear Utility Services, Inc., as director of nuclear fuel management.

John Klosin is the new northeastern regional sales manager for Kearney, headquartering in Newark.

Hugh Blair is the new manager of Allis-Chalmer's Phoenix district.

Forrest Judkins is now manager of manufacturing at G-E's Baltimore insulator department.

Donald Langteau, substation equipment sales application engineer for R T & E Corporation, has been re-assigned to company headquarters as office sales engineer.

heard the one about the

happy utility executive?
he's heard about a new
distribution transformer
LL-65
coming soon from
Westinghouse

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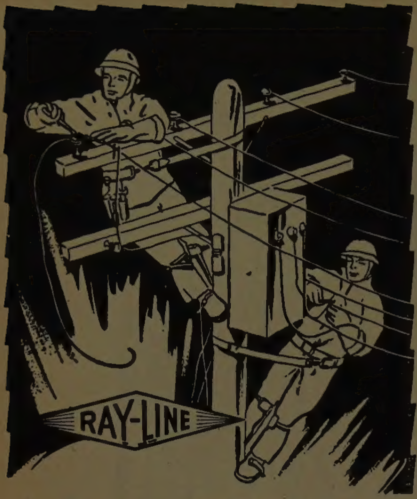

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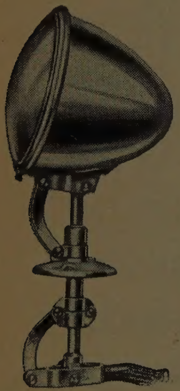
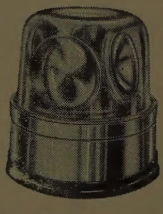


Automotive Roof Mounting SEARCHLITE



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65 PASSAIC AVENUE • KEARNY, N. J.

REGULATORY REVIEW . . .

(Continued from page 50)

as was done in the evidence presented herein tends to reflect a realistic picture of profits in which there is no understatement of cost or overstatement of profits."

And that furthermore:

"The present earnings of the Company on a going level basis, using depreciation based on original cost, are $239,003.94; and the earnings of the Company based on depreciation repriced in current dollars are $128,373.92."

Finally, the Commission ordered the Company to accrue economic depreciation ". . . upon the basis of the cost of its property, repriced in current dollars; and file its annual report with this Commission showing depreciation expense accrued on the basis of original cost and on the basis of cost repriced in current dollars."

It is to be hoped that other jurisdictions will follow the sound reasoning of this Order of the Indiana Public Service Commission.

DIAGNOSIS OF PILC . . .

(Continued from page 61)

from a study of fault analysis records. These, of course, are not the only types of failures that lend themselves to the analytical and statistical approach. If you conscientiously analyze the failures and study the results rather than trusting superficial examination of failures, you will find that there will be savings for your company.

Likewise, the results of the analysis, when recorded and submitted to EEI for inclusion with the Annual Cable Operation Report, become part of the national statistics, which are a convenient yardstick for the electric cable industry.

To summarize, the author is convinced that the laborious-consistent analysis of cable faults is eminently worthwhile. Sometimes the final value is only realized after repetitive notes of an unimportant-appearing condition. A classic example of this in the BECo. was repetition of notes involving sheath wrinkles which led to improving practices with respect to cable racking and to the use of S. L. (separately leaded) cable for some requirements.

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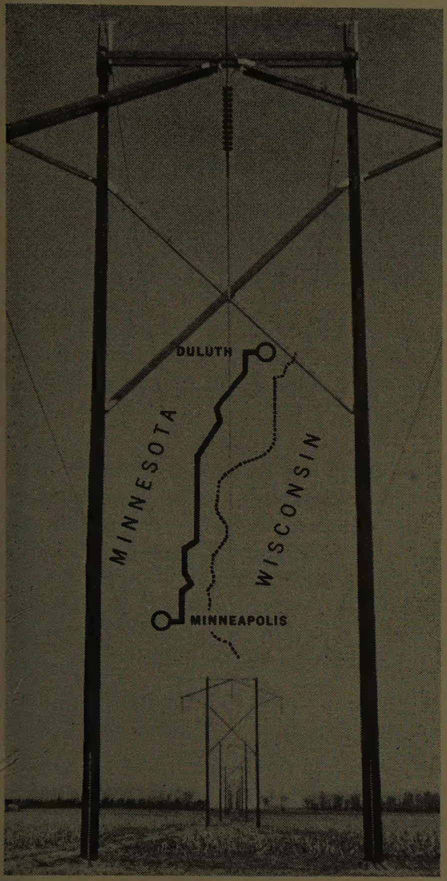
UPPER MISSISSIPPI POWER POOL

(Continued from page 57)



for use in formalizing the sub-area pools. Although months of negotiation of the agreement for the Upper Mississippi Valley Power Pool led to consideration of wide departures from that form, the agreement as finally signed conforms closely with the Power Conference Agreement.

Interchange Services of Pool

The various services interchanged between the member systems in this pool are enumerated in Table I. Each of the service schedules provides a uniform rate for services interchanged between member systems and specifies general ground rules for the transactions. The rates are based upon a sharing of the savings created in each instance.

Equalization Firm Power and Seasonal Equalization Firm Power provide for the sale of power and energy from a specific generating unit. The former classification provides capacity in 12-month periods. The latter deals in 6-month periods to permit excess capacity caused by seasonal load diversity to be marketed to systems able to use it. The iron mining industry, largely an outdoor operation subject to cold winters, has a high summer peak load.

Administration of the pool business is handled by a Planning Committee and an Operating Committee. No central pool office is required. The hour-by-hour interchanges of services are scheduled between the dispatching centers of each of the systems.

North Dakota Pooling

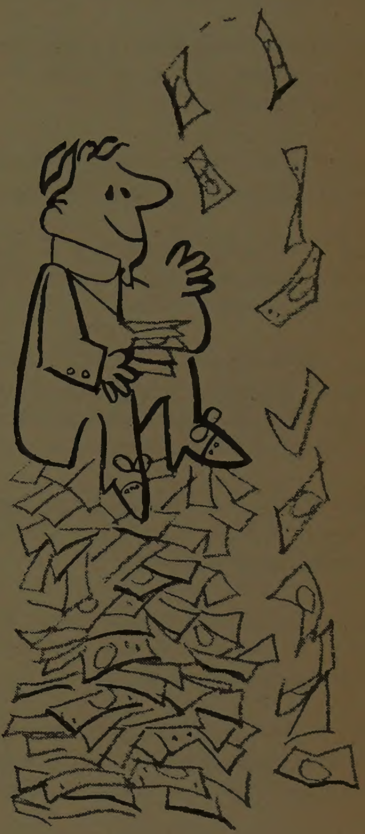
Otter Tail Power operates in a widely-distributed area of North Dakota. Northern States operates divisions centered at Fargo, Grand Forks, and Minot, which interconnect with the parent system through the transmission network of the United States Bureau of Reclamation.

Load density in North Dakota is relatively light. Substantial blocks of preference customer load are supplied by the Federal hydro system on the Missouri River. Pooling in that territory between REA power cooperatives and investor-owned electric utilities is particularly essential to the obtaining for the consumer the cost advantages of installing generation in large units only.

A statement of intent was signed recently by Central Power Electric Cooperative, Minot; Dakotas Electric Cooperative, Bismarck; and Minnkota Power Cooperative, Grand Forks, together with Otter Tail and Northern States at the conclusion of a joint-engineering study of the economics of future power supply in North Dakota. That statement of intent provides for a continuation of coordinated planning.

A pool agreement also will be entered into, similar to that of the Upper Mississippi Valley Power Pool. The agreement will implement an orderly progression of generator-capacity installations in large economical units in amounts generally proportional to the capacity needs of the supplier.

count the dollars



you can save if you'll wait for the new distribution transformer

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CALENDAR OF EVENTS

May 11-13—Pennsylvania Electric Association, Industrial Sales Conference, Skytop Club, Skytop, Pa.

May 14-15—NRECA Rural Areas Development Meeting, Washington Hotel, Washington, D. C.

May 15-16 — Water Pollution Conference, DePaul University, Chicago, Ill.

May 15-17—EEI Purchasing & Stores Committee Meeting, Shamrock-Hilton Hotel, Houston, Texas.

May 16-18 and May 23-25—Line Material Industries, Distribution Systems Seminars, Thomas A. Edison Laboratories, Franksville, Wisc.

May 16-18—7th Annual National Right-Of-Way Seminar, Olympic Hotel, Seattle, Wash.

May 17-19—4th Annual Street Lighting Maintenance Forum, Holiday Inn Motel, Muncie, Ind.

May 17-19—Pacific Coast Electric Association, Annual Convention, Sheraton-Palace Hotel, San Francisco, Calif.

May 18-19—EEI Transmission & Distribution Committee, Netherland Hilton Hotel, Cincinnati, Ohio.

May 18-19—Pennsylvania Electric Association, System Operating Committee, Sky Top Lodge, Skytop, Pa.

May 22-24—American Institute of Electrical Engineers, American Rocket Society, Institute of Radio Engineers, Institute of Aerospace Sciences, and Instrument Society of America, National Telemetering Conference, Sheraton Towers Hotel, Chicago, Ill.

May 22-25—ASME Design Engineering Conference, Cobo Hall, Detroit, Mich.

May 24-26 — NELPA Accounting and Business Practice Conference, Rogue Valley Country Club, Medford, Ore.

May 26—Pennsylvania Electric Association, Relay Committee Meeting, Sky Top Lodge, Skytop, Pa.

June 5-7—29th EEI Annual Convention, Waldorf Astoria, New York, N. Y.

June 6-8—International Instrument-Automation Conference and Exhibit, Royal York Hotel, Toronto, Canada.

June 11-13—Wisconsin Utilities Association, Accounting Section Conference, Dell View Hotel, Lake Delton, Wis.

June 13-14—National Safety Council, Public Utilities Section, Executive Committee, Laurentien Hotel, Montreal, Quebec, Can.

June 18-23 — AIEE Summer General Meeting, Cornell University, Ithaca, N. Y.

June 21-23 — National Committee on Utility Radios, The Nationwide Inn, Columbus, Ohio.

June 25-28 — 54th Annual Meeting, American Society of Agricultural Engineers, Iowa State University, Ames, Iowa.

June 28-30—American Institute of Electrical Engineers, Instrument Society of America, American Institute of Chemical Engineers, American Society of Mechanical Engineers, Institute of Radio Engineers, Second Joint Automatic Control Conference, University of Colorado, Boulder, Colo.

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